ALBERUNI'S INDIA.

AN ACCOUNT OF THE RELIGION, PHILOSOPHY, LITERATURE,
GEOGRAPHY, CHRONOLOGY, ASTRONOMY, CUSTOMS,
LAWS AND ASTROLOGY OF INDIA
ABOUT A.D. 1030.

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An English Edition, with Notes and Indices.

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Dedicated

TO

CHARLES SCHEFER,

MEMBRE DE L'INSTITUT, PARIS,

AS

A HOMAGE BOTH TO

THE MAN AND THE SCHOLAR.

PREFACE.

I.

Maḥmûd and Firdausî.

THE literary history of the East represents the court of King Maḥmûd at Ghazna, the leading monarch of Asiatic history between A.D. 997–1030, as having been a centre of literature, and of poetry in particular. There were four hundred poets chanting in his halls and gardens, at their head famous Unsurî, invested with the recently created dignity of a poet-laureate, who by his verdict opened the way to royal favour for rising talents; there was grand Firdausî, composing his heroic epos by the special orders of the king, with many more kindred spirits. Unfortunately history knows very little of all this, save the fact that Persian poets flocked together in Ghazna, trying their kasîdas on the king, his ministers and generals. History paints Maḥmûd as a successful warrior, but ignores him as a Mæcenas. With the sole exception of the lucubrations of bombastic Utbî, all contemporary records, the *Makâmât* of Abû-Nasr Mishkânî, the *Tabaḳât* of his secretary Baihaḳî, the chronicles of Mullâ Muḥammad Ghaznavî, Maḥmûd Warrâk, and others, have perished, or not yet come to light, and the attempts at a literary history dating from a time 300–400 years later, the so-called *Tadhkiras*, weigh very light in the scale of matter-of-fact examination, failing almost invariably whenever they are applied to for information on some detail of ancient Persian literature. However this may be, Unsurî, the panegyrist, does not seem to have missed the sun of royal favour, whilst Firdausî, immortal Firdausî, had to fly in disguise to evade the doom of being trampled to death by elephants. Attracted by the rising fortune of the young emperor, he seems to have repaired to his court only a year after his enthronisation, *i.e.* A.D. 998. But when he had finished his *Shâhnâma*, and found himself disappointed in his hopes for reward, he flung at him his famous satire, and fled into peaceless exile (A.D. 1010).[1] In the case of the king *versus* the poet the king has lost. As long as Firdausi retains the place of honour accorded to him in the history of the world's mental achievements, the stigma will cling to the name of Maḥmûd, that he who hoarded up perhaps more worldly treasures than were ever hoarded up, did not know how to honour a poet destined for immortality.

And how did the author of this work, as remarkable among the prose compositions of the East as the *Shâhnâma* in poetry, fare with the royal Mæcenas of Ghazna?

Maḥmûd and Alberuni.

Alberuni, or, as his compatriots called him, Abû Raiḥân, was born A.D. 973, in the territory of modern Khiva, then called Khwârizm, or Chorasmia in antiquity.[2] Early distinguishing himself in science and literature, he played a political part as councillor of the ruling prince of his native country of the Ma'mûnî family. The counsels he gave do not seem always to have suited the plans of King Maḥmûd at Ghazna, who was looking out for a pretext for interfering in the affairs of independent Khiva, although its rulers were his own near relatives. This pretext was furnished by a military *émeute*.

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[1] *Cf.* J. Mohl, *Le Livre des Rois*, traduit, &c. Publié par Mme. Mohl, 1876, préface, pp. xl. *seq.*

[2] There is a reminiscence of his native country, i. 166, where he speaks of a kind of measure used in Khwârizm.

Maḥmûd marched into the country, not without some fighting, established there one of his generals as provincial governor, and soon returned to Ghazna with much booty and a great part of the Khiva troops, together with the princes of the deposed family of Ma'mûn and the leading men of the country as prisoners of war or as hostages. Among the last was Abû-Raiḥân Muḥammad Ibn Ahmad Alberuni.

This happened in the spring and summer of A.D. 1017. The Chorasmian princes were sent to distant fortresses as prisoners of state, the Chorasmian soldiers were incorporated in Maḥmûd's Indian army; and Alberuni—what treatment did *he* experience at Ghazna? From the very outset it is not likely that both the king and his chancellor, Aḥmad Ibn Hasan Maimandi, should have accorded special favours to a man whom they knew to have been their political antagonist for years. The latter, the same man who had been the cause of the tragic catastrophe in the life of Firdausî, was in office under Maḥmûd from A.D. 1007–1025, and a second time under his son and successor, Masʿûd, from 1030–1033. There is nothing to tell us that Alberuni was ever in the service of the state or court in Ghazna. A friend of his and companion of his exile, the Christian philosopher and physician from Bagdad, Abulkhair Alkhammâr, seems to have practised in Ghazna his medical profession. Alberuni probably enjoyed the reputation of a great *munajjim, i.e.* astrologer-astronomer, and perhaps it was in this quality that he had relations to the court and its head, as Tycho de Brahe to the Emperor Rudolf. When writing the *'Ινδικά*, thirteen years after his involuntary immigration to Afghanistan, he was a master of astrology, both according to the Greek and the Hindu system, and indeed Eastern writers of later centuries seem to consider him as having been the court astrologer of King Maḥmûd. In a book written five hundred years later (v. *Chresto-*

mathie Persane, &c., par Ch. Schefer, Paris, 1883, i. p. 107 of the Persian text), there is a story of a practical joke which Maḥmûd played on Alberuni as an astrologer. Whether this be historic truth or a late invention, anyhow the story does not throw much light on the author's situation in a period of his life which is the most interesting to us, that one, namely, when he commenced to study India, Sanskrit and Sanskrit literature.

Historic tradition failing us, we are reduced to a single source of information—the author's work—and must examine to what degree his personal relations are indicated by his own words. When he wrote, King Maḥmûd had been dead only a few weeks. *Le roi est mort*—but to whom was *Vive le roi* to be addressed?

Two heirs claimed the throne, Muḥammad and Masʿûd, and were marching against each other to settle their claims by the sword. Under these circumstances it comes out as a characteristic fact that the book has no dedication whatever, either to the memory of Maḥmûd, or to one of the rival princes, or to any of the indifferent or non-political princes of the royal house. As a cautious politician, he awaited the issue of the contest; but when the dice had been thrown, and Masʿûd was firmly established on the throne of his father, he at once hastened to dedicate to him the greatest work of his life, the *Canon Masudicus*. If he had been affected by any feeling of sincere gratitude, he might have erected in the *'Ινδικά* a monument to the memory of the dead king, under whose rule he had made the necessary preparatory studies, and might have praised him as the great propagator of Islam, without probably incurring any risk. He has not done so, and the terms in which he speaks of Maḥmûd throughout his book are not such as a man would use when speaking of a deceased person who had been his benefactor.

He is called simply *The Amîr Maḥmûd*, ii. 13 (Arabic text, p. 208, 9), *The Amîr Maḥmûd, may God's mercy be with him*, i. 116 (text, p. 56, 8), *The Amîr Maḥmûd, may the grace of God be with him*, ii. 103 (text, p. 252, 11). The title *Amîr* was nothing very complimentary. It had been borne by his ancestors when they were simply generals and provincial governors in the service of the Sâmâni king of Transoxiana and Khurasan. Speaking of Maḥmûd and his father Sabuktagîn, the author says, *Yamîn-aldaula Maḥmûd, may God's mercy be with them*, i. 22 (text, p. 11, 9). He had received the title *Yamîn-aldaula, i.e. The right hand of the dynasty* (of the Khalif), from the Khalif, as a recognition of the legitimacy of his rule, resembling the investiture of the German Emperor by the Pope in the Middle Ages. Lastly, we find at ii. 2 (text, p. 203, 20) the following terms: "*The strongest of the pillars* (of Islam), *the pattern of a Sultan, Maḥmûd, the lion of the world and the rarity of the age, may God's mercy be with him.*"

Whoever knows the style of Oriental authors when speaking of crowned heads, the style of their prefaces, which attains the height of absurdity at the court of the Moghul emperors at Delhi, will agree with me that the manner in which the author mentions the dead king is cold, cold in the extreme; that the words of praise bestowed upon him are meagre and stiff, a poor sort of praise for a man who had been the first man in Islam, and the founder of Islam in India; lastly, that the phrases of benediction which are appended to his name, according to a general custom of Islam, are the same as the author would have employed when speaking of any acquaintance of his in common life who had died. He says of Maḥmûd (i. 22): "He utterly ruined the prosperity of the country (of India), and performed those wonderful exploits by which the Hindus became like atoms of dust scattered in all directions, and like a tale of old in the mouth of the people." To criticise these words from a Muslim point of view, the passage of the ruining of the prosperity of the country was perfectly out of place in the glorification of a Ghâzî like Maḥmûd.

That it was not at all against the moral principles of Alberuni to write such dedications to princes is shown by two other publications of his, with dedications which exhibit the customary Byzantinism of the time. In the preface of the "Chronology of Ancient Nations" (translated, &c., by Edward Sachau, London, 1879), he extols with abundant praise the prince of Hyrcania or Jurjân, Shams-alma'âlî, who was a dwarf by the side of giant Maḥmûd. The studied character of the neglect of Maḥmûd in the *'Ινδικά* comes out more strongly if we compare the unmerited praise which Alberuni lavishes upon his son and successor. The preface of his *Canon Masudicus* is a farrago of high-sounding words in honour of King Mas'ûd, who was a drunkard, and lost in less than a decennium most of what his father's sword and policy had gained in thirty-three years. The tenor of this preface, taken from the manuscript of the Royal Library in Berlin, is as follows:—

To those who lead the community of the believers in the place of the Prophet and by the help of the Word of God belongs "the king, the lord majestic and venerated, the helper of the representative of God, the furtherer of the law of God, the protector of the slaves of God, who punishes the enemies of God, Abû-Sa'îd Mas'ûd Ibn Yamîn-aldaula and 'Amîn-almilla Maḥmûd—may God give him a long life, and let him perpetually rise to glorious and memorable deeds. For a confirmation of what we here say of him lies in the fact that God, on considering the matter, restored the right (*i.e.* the right of being ruled by Mas'ûd) to his people, after it had been concealed. God brought it to light. After he had been in distress, God helped him. After he had been rejected, God raised him, and brought him the empire and the rule, after people from all sides had tried to get possession of it, speaking: 'How should he come to rule over us, as we have a better right to the rule than he?' But then they received (from God) an answer in the event (lit. sign) which followed. God carried out His promise relating to him (Mas'ûd), giving him the inheritance without his asking for it, as He gave the inheritance of David to Solomon without reserve. (That is, the dead King Maḥmûd had proclaimed as his successor his son Muḥammad, not Mas'ûd, but the latter contested the will of his father, and in the following contest with his brother he was the winner.) If God had not chosen him, the hearts of men would not have been gained (?) for him, and the intrigues of his enemies would not have missed their aim. In short, the souls of men hastened to meet him in order to live under his shadow. The order of God was an act of predestination, and his becoming king was written in the Book of Books in heaven (from all eternity).

"He—may God make his rule everlasting!—has conferred upon me a favour which was a high distinction to me, and has placed me under the obligation of everlasting gratitude. For although a benefactor may dispense with the thank-offerings for his deeds, &c., a sound heart inspires those who receive them with the fear that they might be lost (to general notice), and lays upon them the obligation of spreading them and making them known in the world. But already, before I received this favour, I shared with the inhabitants of all his countries the blessings of his rule, of peace and justice. However, then the *special service* (towards his Majesty) became incumbent upon me, after (until that time) obeying in general (his Majesty) had been incumbent on me. (This means, probably, that Mas'ûd conferred a special benefit (a pension?) on the author, not immediately after he had come to the throne, but some time later.) Is it not he who has enabled me for the rest of my life (Alberuni was then sixty-one years old) to devote myself entirely to the service of science, as he let me dwell under the shadow of his power and let the cloud of his favour rain on me, always personally distinguishing and befriending me, &c.? And with regard to this (the favour conferred upon me), he has deigned to send his orders to the treasury and the ministry, which certainly is the utmost that kings can do for their subjects. Mey God Almighty reward him both in this and in yonder world," &c.

Thereupon, finding that his Majesty did not require his actual service, and besides, finding that science stood in the highest favour with him, he composes a book on astronomy, to which he had been addicted all his life, and adorns it with the name of his Majesty, calling it *Canon Masudicus* (*Alḳânûn Almas'ûdî*), &c.

To put the phrases of this preface into plain language, the author was in favour with King Mas'ûd; he had access to the court—living, probably, near it—and received an income which enabled him to devote himself entirely to his scientific work. Besides, all this appears as a new state of things, the reverse of which had been the case under the king's predecessor, his father, Maḥmûd. We do not know the year in which this change in the life of Alberuni was brought about. Perhaps it was in some way connected with the fact that the chancellor, Maimandî, died A.D. 1033, and that after him one Abû-Naṣr Aḥmad Ibn Muḥammad Ibn 'Abduṣṣamad became chancellor, who before, *i.e.* from 1017 to 1033, had administered Khwarizm, the native country of Alberuni. He and Maimundî had been political antagonists—not so he and 'Abduṣṣamad.

The difference of the author's condition, as it appears to have been under Mas'ûd, from what it was under Maḥmûd when he prepared the *'Ινδικά*, is further illustrated by certain passages in the book itself. When speaking of the difficulties with which he had to grapple in his efforts to learn everything about India, he continues: "What scholar, however, has the same favourable opportunities of studying this subject as I have? That would be only the case with one to whom the grace of God accords, what it did not accord to me, a perfectly free disposal of his own doings and goings; for it has never fallen to my lot in my own doings and goings to be perfectly independent, nor to be invested with sufficient power to dispose and to order as I thought best. However, I thank God for that which He has bestowed upon me, and which must be considered as sufficient for the purpose" (i. 24). These lines seem to say that the author, both at Ghazna and in India, at Multân, Peshâvar, &c., had the opportunity of conversing with pandits, of procuring their help, and of buying books; that, however, in other directions he was not his own master, but had to obey a higher will; and lastly, that he was not a man in authority.

In another place (i. 152) he explains that art and science require the protection of kings. "For they alone could free the minds of scholars from the daily anxieties for the necessities of life, and stimulate their energies to earn more fame and favour, the yearning for which is the pith and marrow of human nature. The present times, however, are not of this kind. They are the very opposite, and therefore it is quite impossible that a new science or any new kind of research should arise in our days. What we have of sciences is nothing but the scanty remains of bygone better times." Compare with this a dictum quoted (i. 188): "The scholars are well aware of the use of money, but the rich are ignorant of the nobility of science."

These are not the words of an author who basks in the sunshine of royal protection. The time he speaks of is the time of Maḥmûd, and it is Maḥmûd whom he accuses of having failed in the duties of a protector of art and science imposed upon him by his royal office. Firdausî, in his satire (Mohl, i. préf. p. xlv.), calls him "*un roi qui n'a ni foi ni loi ni manières*" (*royales*); and he says: "*Si le roi avait été un homme digne de renom, il aurait honoré le savoir,*" &c. It is most remarkable to what degree Firdausî and Alberuni agree in their judgment of the king. To neither of them had he been a Mæcenas.

In the absence of positive information, we have tried to form a chain of combinations from which we may infer, with a tolerable degree of certainty, that our author, during the thirteen years of his life from 1017 to 1030, after he had been carried from his native country to the centre of Maḥmûd's realm, did not enjoy the favours of the king and his leading men; that he stayed in different parts of India (as a companion of the princes of his native country?), probably in the character of a hostage or political prisoner kept on honourable terms; that he spent his leisure in the study of India; and that he had no official inducement or encouragement for this study, nor any hope of royal reward.

A radical change in all this takes place with the accession of Mas'ûd. There is no more complaint of the time and its ruler. Alberuni is all glee and exultation about the royal favours and support accorded to him and to his studies. He now wrote the greatest work of his life,[1] and with a swelling heart and overflowing words he proclaims in the preface the praise of his benefactor. Living in Ghazna, he seems to have forgotten India to a great extent. For in the *Canon Masudicus* he rarely refers to India; its chapter on Hindu eras does not prove any progress of his studies beyond that which he exhibits in the *'Ινδικά*, and at the end of it he is even capable of confounding the era of the astronomers, as used in the *Khaṇḍakhâdyaka* of Brahmagupta, with the Guptakâla.

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[1] The *Canon Masudicus*, extant in four good copies in European libraries, waits for the patronage of some Academy of Sciences or some Government, and for the combination of two scholars, an astronomer and an Arabic philologist, for the purpose of an edition and translation.

The author's interest in India.

If the author and his countrymen had suffered and were still suffering from the oppression of King Maḥmûd, the Hindus were in the same position, and perhaps it was this community of mishap which inspired him with sympathy for them. And certainly the Hindus and their world of thought have a paramount, fascinating interest for him, and he inquires with the greatest predilection into every Indian subject, howsoever heathenish it may be, as though he were treating of the most important questions for the souls of Muhammadans,—of free-will and predestination, of future reward and punishment, of the creation or eternity of the Word of God, &c. To Maḥmûd the Hindus were infidels, to be dispatched to hell as soon as they refused to be plundered. To go on expeditions and to fill the treasury with gold, not to make lasting conquests of territories, was the real object of his famous expeditions; and it was with this view that he cut his way through enormous distances to the richest temples of India at Tanêshar, Mathurâ, Kanoj, and Somanâth.

To Alberuni the Hindus were excellent philosophers, good mathematicians and astronomers, though he naïvely believes himself to be superior to them, and disdains to be put on a level with them (i. 23).[1] He does not conceal whatever he considers wrong and unpractical with them, but he duly appreciates their mental achievements, takes the greatest pains to appropriate them to himself, even such as could not be of any use to him or to his readers, *e.g.* Sanskrit metrics; and whenever he hits upon something that is noble and grand both in science and in practical life, he never fails to lay it before his readers with warm-hearted words of approbation. Speaking of the construction of the ponds at holy bathing-places, he says: "In this they have attained a very high degree of art, so that our people (the Muslims), when they see them, wonder at them, and are unable to describe them, much less to construct anything like them" (ii. 144).

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[1] For a similar trait of self-confidence *cf.* i. 277, last lines.

Apparently Alberuni felt a strong inclination towards Indian philosophy. He seems to have thought that the philosophers both in ancient Greece and India, whom he most carefully and repeatedly distinguishes from the ignorant, image-loving crowd, held in reality the very same ideas, the same as seem to have been his own, *i.e.* those of a pure monotheism; that, in fact, originally all men were alike pure and virtuous, worshipping one sole Almighty God, but that the dark passions of the crowd in the course of time had given rise to the difference of religion, of philosophical and political persuasions, and of idolatry. "The first cause of idolatry was the desire of commemorating the dead and of consoling the living; but on this basis it has developed, and has finally become a foul and pernicious abuse" (i. 124).

He seems to have revelled in the pure theories of the *Bhagavadgîtâ*, and it deserves to be noticed that he twice mentions the saying of Vyâsa, "Learn twenty-five (*i.e.*, the elements of existence) by distinctions, &c. Afterwards adhere to whatever religion you like; your end will be salvation" (i. 44, and also i. 104). In one case he even goes so far as to speak of Hindu scholars as "*enjoying the help of God*," which to a Muslim means as much as *inspired by God, guided by divine inspiration* (ii. 108). These words are an addition of the author's in his paraphrase of the *Brihatsaṁhitâ* of Varâhamihira, v. 8. There can be scarcely any doubt that Muslims of later times would have found fault with him for going to such length in his interest for those heathenish doctrines, and it is a singular fact that Alberuni wrote under a prince who burned and impaled the Karmatians (*cf.* note to i. 31).

Still he was a Muslim; whether Sunnî or Shî'a cannot be gathered from the 'Ινδική. He sometimes takes an occasion for pointing out to the reader the superiority of Islam over Brahmanic India. He contrasts the democratic equality of men with the castes of India, the matrimonial law of Islam with degraded forms of it in India, the cleanliness and decency of Muslims with filthy customs of the Hindus. With all this, his recognition of Islam is not without a tacit reserve. He dares not attack Islam, but he attacks the Arabs. In his work on chronology he reproaches the ancient Muslims with having destroyed the civilisation of Eran, and gives us to understand that the ancient Arabs were certainly nothing better than the Zoroastrian Eranians. So too in the 'Ινδική, whenever he speaks of a dark side in Hindu life, he at once turns round sharply to compare the manners of the ancient Arabs, and to declare that they were quite as bad, if not worse. This could only be meant as a hint to the Muslim reader not to be too haughty towards the poor bewildered Hindu, trodden down by the savage hordes of King Maḥmûd, and not to forget that the founders of Islam, too, were certainly no angels.

The author' character.

Independent in his thoughts about religion and philosophy, he is a friend of clear, determined, and manly words. He abhors half-truths, veiled words, and wavering action. Everywhere he comes forward as a champion of his conviction with the courage of a man. As in religion and philosophy, so too in politics. There are some remarkable sentences of political philosophy in the introductions to chapters ix. and lxxi. As a politician of a highly conservative stamp, he stands up for throne and altar, and declares that "their union represents the highest development of human society, all that men can possibly desire" (i. 99). He is capable of admiring the mildness of the law of the Gospel: "To offer to him who has beaten your cheek the other cheek also, to bless your enemy and to pray for him. Upon my life, this is a noble philosophy; but the people of this world are not all philosophers. Most of them are ignorant and erring, who cannot be kept on the straight road save by the sword and the whip. And, indeed, ever since Constantine the Victorious became a Christian, both sword and whip have ever been employed, for without them it would be impossible to rule" (ii. 161). Although a scholar by profession, he is capable of taking the practical side of a case, and he applauds the Khalif Mu'âviya for having sold the golden gods of Sicily to the princes of Sindh for money's worth, instead of destroying them as heathen abominations, as bigoted Muslims would probably have liked him to do. His preaching the union of throne and altar does not prevent him from speaking with undisguised contempt of the "preconcerted tricks of the priests" having the purpose of enthralling the ignorant crowd (i. 123).

He is a stern judge both of himself and of others. Himself perfectly sincere, it is sincerity which he demands from others. Whenever he does not fully understand a subject, or only knows part of it, he will at once tell the reader so, either asking the reader's pardon for his ignorance, or promising, though a man of fifty-eight years, to continue his labours and to publish their results in time, as though he were acting under a moral responsibility to the public. He always sharply draws the limits of his knowledge; and although he has only a smattering of the metrical system of the Hindus, he communicates whatever little he knows, guided by the principle that the best must not be the enemy of the better (i. 200, 6–9), as though he were afraid that he should not live long enough to finish the study in question. He is not a friend of those who "hate to avow their ignorance by a frank *I do not know*" (i. 177), and he is roused to strong indignation whenever he meets with want of sincerity. If Brahmagupta teaches two theories of the eclipses, the popular one of the dragon Râhu's devouring the luminous body, and the scientific one, he certainly committed the sin against conscience from undue concessions to the priests of the nation, and from fear of a fate like that which befell Socrates when he came into collision with the persuasions of the majority of his countrymen. *Cf.* chapter lix. In another place he accuses Brahmagupta of injustice and rudeness to his predecessor, Âryabhaṭa (i. 376). He finds in the works of Varâhamihira by the side of honest scientific work sentences which sound to him "*like the ravings of a madman*" (ii. 117), but he is kind enough to suggest that behind those passages there is perhaps an esoteric meaning, unknown to him, but more to the credit of the author. When, however, Varâhamihira seems to exceed all limits of common sense, Alberuni thinks that "*to such things silence is the only proper answer*" (ii. 114).

His professional zeal, and the principle that *learning is the fruit of repetition* (ii. 198), sometimes induce him to indulge in repetitions, and his thorough honesty sometimes misleads him to use harsh and even rude words. He cordially hates the verbosity of Indian authors or versifiers,[1] who use lots of words where a single one would be sufficient. He calls it "mere nonsense—a means of keeping people in the dark and throwing an air of mystery about the subject. And in any case this copiousness (of words denoting the same thing) offers painful difficulties to those who want to learn the whole language, and only results in a sheer waste of time" (i. 229, 299, 19). He twice explains the origin of the Dibajat, *i.e.* Maledives and Laccadives (i. 233; ii. 106); twice the configuration of the borders of the Indian Ocean (i. 197, 270).

Whenever he suspects humbug, he is not backward in calling it by the right name. Thinking of the horrid practices of Rasâyana, *i.e.* the art of making gold, of making old people young, &c., he bursts out into sarcastic words which are more coarse in the original than in my translation (i. 189). In eloquent words he utters his indignation on the same subject (i. 193): "The greediness of the ignorant Hindu princes for gold-making does not know any limit," &c. There is a spark of grim humour in his words on i. 237, where he criticises the cosmographic ravings of a Hindu author: "We, on our part, found it already troublesome enough to enumerate all the seven seas, together with the seven earths, and now this author thinks he can make the subject more easy and pleasant to us by inventing some more earths below those already enumerated by ourselves!" And when jugglers from Kanoj lectured to him on chronology, the stern scholar seems to have been moved to something like a grin. "I used great care in examining every single one of them, in repeating the same questions at different times in a different order and context. But lo! what different answers did I get! God is all-wise" (ii. 129).

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[1] *Cf.* his sarcasms on the versifying bias of Hindu authors, i. 137.

The tendency of his work.

In the opening of his book Alberuni gives an account of the circumstances which suggested to him the idea of writing the Ἰνδικά. Once the conversation with a friend of his, else unknown, ran on the then existing literature on the history of religion and philosophy, its merits and demerits. When, in particular, the literature on the belief of the Hindus came to be criticised, Alberuni maintained that all of it was second-hand and thoroughly uncritical. To verify the matter, his friend once more examines the books in question, which results in his agreeing with our author, and his asking him to fill up this gap in the Arabic literature of the time. The book he has produced is not a polemical one. He will not convert the Hindus, nor lend a direct help to missionary zealots. He will simply describe Hinduism, without identifying himself with it. He takes care to inform the reader that *he* is not responsible for whatsoever repugnant detail he has to relate, but the Hindus themselves. He gives a repertory of information on Indian subjects, destined for the use of those who lived in peaceable intercourse with them, and wished to have an insight into their mode and world of thought (i. 7; ii. 246).

The author has nothing in common with the Muhammadan Ghâzî who wanted to convert the Hindus or to kill them, and his book scarcely reminds the reader of the incessant war between Islam and India, during which it had been prepared, and by which the possibility of writing such a book had first been given. It is like a magic island of quiet, impartial research in the midst of a world of clashing swords, burning towns, and plundered temples. The object which the author had in view, and never for a moment lost sight of, was to afford the necessary information and training to "*any one* (in Islam) *who wants to converse with the Hindus, and to discuss with them questions of religion, science, or literature, on the very basis of their own civilisation*" (ii. 246).

The author and his readers.

It is difficult to say what kind of readers Alberuni had, or expected to have, not only for the Ἰνδικά, but for all his other publications on Indian subjects. Probably educated, and not bigoted or fanatical Muslims in Sindh, in parts of the Panjab, where they were living by the side of Hindus and in daily intercourse with them; perhaps, also, for such in Kabul, the suburb of which had still a Hindu population in the second half of the tenth century, Ghazna, and other parts of Afghanistan. When speaking of the *Pulisasiddhânta*, a standard work on astronomy, he says: "A translation of his (Pulisa's) whole work into Arabic has not hitherto yet been undertaken, because in his mathematical problems there is an evident religious and theological tendency"[1] (i. 375). He does not tell us what this particular tendency was to which the readers objected, but we learn so much from this note that in his time, and probably also in his neighbourhood, there were circles of educated men who had an interest in getting the scientific works of India translated into Arabic, who at the same time were sufficiently familiar with the subject-matter to criticise the various representations of the same subject, and to give the preference to one, to the exclusion of another. That our author had a certain public among Hindus seems to be indicated by the fact that he composed some publications for people in Kashmîr; *cf.* preface to the edition of the text, p. xx. These relations to Kashmîr are very difficult to understand, as Muslims had not yet conquered the country, nor entered it to any extent, and as the author himself (i. 206) relates that it was closed to intercourse with all strangers save a few Jews. Whatever the interest of Muslims for the literature of and on India may have been, we are under the impression that this kind of literature has never taken deep root; for after Alberuni's death, in A.D. 1048, there is no more original work in this field; and even Alberuni, when he wrote, was quite alone in the field. Enumerating the difficulties which beset his study of India, he says: "I found it very hard to work into the subject, although I have a great liking for it, *in which respect I stand quite alone in my time,*" &c. (i. 24). And certainly we do not know of any Indianist like him, before his time or after.

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[1] Alberuni does not seem to have shared these scruples, for he translated it into Arabic (*cf.* i. 154).

The author's method.

In general it is the method of our author not to speak himself, but to let the Hindus speak, giving extensive quotations from their classical authors. He presents a picture of Indian civilisation as painted by the Hindus themselves. Many chapters, not all, open with a short characteristic introduction of a general nature. The body of most chapters consists of three parts. The first is a *précis* of the question, as the author understands it.

The second part brings forward the doctrines of the Hindus, quotations from Sanskrit books in the chapters on religion, philosophy, astronomy, and astrology, and other kinds of information which had been communicated to him by word of mouth, or things which he had himself observed in the chapters on literature, historic chronology, geography, law, manners, and customs. In the third part he does the same as Megasthenes had already done; he tries to bring the sometimes very exotic subject nearer to the understanding of his readers by comparing it with the theories of ancient Greece, and by other comparisons. As an example of this kind of arrangement, *cf.* Chapter v. In the disposition of every single chapter, as well as in the sequence of the chapters, a perspicuous, well-considered plan is apparent. There is no patchwork nor anything superfluous, and the words fit to the subject as close as possible. We seem to recognise the professional mathematician in the perspicuity and classical order throughout the whole composition, and there was scarcely an occasion for him to excuse himself, as he does at the end of Chapter i. (i. 26), for not being able everywhere strictly to adhere to the geometrical method, as he was sometimes compelled to introduce an unknown factor, because the explanation could only be given in a later part of the book.

The author's critical mind.

He does not blindly accept the traditions of former ages; he wants to understand and to criticise them. He wants to sift the wheat from the chaff, and he will discard everything that militates against the laws of nature and of reason. The reader will remember that Alberuni was also a physical scholar, and had published works on most departments of natural science, optics, mechanics, mineralogy, and chemistry; *cf.* his geological speculation on the indications of India once having been a sea (i. 198), and a characteristic specimen of his natural philosophy (i. 400). That he believed in the action of the planets on the sublunary world I take for certain, though he nowhere says so. It would hardly be intelligible why he should have spent so much time and labour on the study of Greek and Indian astrology if he had not believed in the truth of the thing. He gives a sketch of Indian astrology in Chapter lxxx., because Muslim readers "are not acquainted with the Hindu methods of astrology, and have never had an opportunity of studying an Indian book" (ii. 211). Bardesanes, a Syrian philosopher and poet in the second half of the second Christian century, condemned astrology in plain and weighty words. Alberuni did not rise to this height, remaining entangled in the notions of Greek astrology.

He did not believe in alchemy, for he distinguishes between such of its practices as are of a chemical or mineralogical character, and such as are intentional deceit, which he condemns in the strongest possible terms (i. 187).

He criticises manuscript tradition like a modern philologist. He sometimes supposes the text to be corrupt, and inquires into the cause of the corruption; he discusses various readings, and proposes emendations. He guesses at *lacunæ*, criticises different translations, and complains of the carelessness and ignorance of the copyists (ii. 76; i. 162–163). He is aware that Indian works, badly translated and carelessly copied by the successive copyists, very soon degenerate to such a degree that an Indian author would hardly recognise his own work, if it were presented to him in such a garb. All these complaints are perfectly true, particularly as regards the proper names. That in his essays at emendation he sometimes went astray, that, *e.g.* he was not prepared fully to do justice to Brahmagupta, will readily be excused by the fact that at his time it was next to impossible to learn Sanskrit with a sufficient degree of accuracy and completeness.

When I drew the first sketch of the life of Alberuni ten years ago, I cherished the hope that more materials for his biography would come to light in the libraries of both the East and West. This has not been the case, so far as I am aware. To gain an estimate of his character we must try to read between the lines of his books, and to glean whatever minute indications may there be found. A picture of his character cannot therefore at the present be anything but very imperfect, and a detailed appreciation of his services in the advancement of science cannot be undertaken until all the numerous works of his pen have been studied and rendered accessible to the learned world. The principal domain of his work included astronomy, mathematics, chronology, mathematical geography, physics, chemistry, and mineralogy. By the side of this professional work he composed about twenty books on India, both translations and original compositions, and a number of tales and legends, mostly derived from the ancient lore of Eran and India. As probably most valuable contributions to the historic literature of the time, we must mention his history of his native country Khwârizm, and the history of the famous sect of the Karmatians, the loss of both of which is much to be deplored.

II.

On the origines of Arabic literature.

The court of the Khalifs of the house of Omayya at Damascus does not seem to have been a home for literature. Except for the practical necessities of administration, they had no desire for the civilisation of Greece, Egypt, or Persia, their thoughts being engrossed by war and politics and the amassing of wealth. Probably they had a certain predilection for poetry common to all Arabs, but they did not think of encouraging historiography, much to their own disadvantage. In many ways these Arab princes, only recently emerged from the rocky wilderness of the Hijâz, and suddenly raised to imperial power, retained much of the great Bedouin Shaikh of the desert. Several of them, shunning Damascus, preferred to stay in the desert or on its border, and we may surmise that in their households at Rusâfa and Khunâsara there was scarcely more thought of literature than at present in the halls of Ibn Arrashîd, the wily head of the Shammar at Hâil. The cradle of Arabic literature is not Damascus, but Bagdad, and the protection necessary for its rise and growth was afforded by the Khalifs of the house of Abbâs, whose Arab nature had been modified by the influence of Eranian civilisation during a long stay in Khurâsân.

The foundation of Arabic literature was laid between A.D. 750 and 850. It is only the tradition relating to their religion and prophet and poetry that is peculiar to the Arabs; everything else is of foreign descent. The development of a large literature, with numerous ramifications, is chiefly the work of foreigners, carried out with foreign materials, as in Rome the *origines* of the national literature mostly point to Greek sources. Greece, Persia, and India were taxed to help the sterility of the Arab mind.

What Greece has contributed by lending its Aristotle, Ptolemy, and Harpocrates is known in general. A detailed description of the influx and spread of Greek literature would mark a memorable progress in Oriental philology. Such a work may be undertaken with some chance of success by one who is familiar with the state of Greek literature at the centres of learning during the last centuries of Greek heathendom, although he would have to struggle against the lamentable fact that most Arabic books of this most ancient period are lost, and probably lost for ever.

Persian element in Arabic literature.

What did Persia, or rather the Sasanian empire, overrun by the Arab hordes, offer to its victors in literature?

It left to the east of the Khalifate the language of administration, the use of which during the following centuries, till recent times, was probably never much discontinued. It was this Perso-Sasanian language of administration which passed into the use of the smaller Eastern dynasties, reared under the Abbaside Khalifs, and became the language of literature at the court of one of those dynasties, that of the Sâmânî kings of Transoxiana and Khurâsân. Thus it has come to pass that the dialect of one of the most western parts of Eran first emerged as the language of literature in its farthest east. In a similar way modern German is an offspring of the language used in the chanceries of the Luxembourg emperors of Germany.

The bulk of the narrative literature, tales, legends, novels, came to the Arabs in translations from the Persian, *e.g.* the "Thousand and One Nights," the stories told by the mouth of animals, like *Kalîla and Dimna*, probably all of Buddhistic origin, portions of the national lore of Eran, taken from the *Khudâinâma*, or Lord's Book, and afterwards immortalised by Firdausi; but more than anything else love-stories. All this was the fashion under the Abbaside Khalifs, and is said to have attained the height of popularity during the rule of Almuḳtadir, A.D. 908–932. Besides, much favour was apparently bestowed upon didactic, parænetic compositions, mostly clothed in the garb of a testament of this or that Sasanian king or sage, *e.g.* Anushirvân and his minister Buzurjumihr, likewise upon collections of moralistic apothegms. All this was translated from Persian, or pretended to be so. Books on the science of war, the knowledge of weapons, the veterinary art, falconry, and the various methods of divination, and some books on medicine and *de rebus venereis*, were likewise borrowed from the Persians. It is noteworthy that, on the other hand, there are very few traces of the exact sciences, such as mathematics and astronomy, among the Sasanian Persians. Either they had only little of this kind, or the Arabs did not choose to get it translated.

An author by the name of 'Alî Ibn Ziyâd Altamîmî is said to have translated from Persian a book, *Zîj-alshahriyâr*, which, to judge by the title, must have been a system of astronomy. It seems to have been extant when Alberuni wrote his work on chronology; *vide* "Chronology of Ancient Nations," translated, &c., by Edward Sachau, London, 1876, p. 6, and note p. 368. Perhaps it was from this source that the famous Alkhwârizmî drew his knowledge of Persian astronomy, which he is said to have exhibited in his extract from the *Brahmasiddhânta*, composed by order of the Khalif Ma'mûn. For we are expressly told (*vide* Gildemeister, *Scriptorum Arabum de rebus Indicis loci*, &c., p. 101) that he used the *media*, *i.e.* the mean places of the planets as fixed by Brahmagupta, whilst in other things he deviated from him, giving the equations of the planetary revolutions according to the theory of the *Persians*, and the declination of the sun according to Ptolemy. Of what kind this Persian astronomy was we do not know, but we must assume that it was of a scientific character, based on observation and computation, else Alkhwârizmî would not have introduced its results into his own work. Of the terminology of Arabian astronomy, the word *jauzahar* = Caput draconis, is probably of Sasanian origin (*gaocithra*), as well as the word *zîj* (= canon), *i.e.* a collection of astronomical tables with the necessary explanations, perhaps also *kardaj*, *kardaja*, a measure in geometry equal to $\frac{1}{60}$th of the circumference of a circle, if it be identical with the Persian *karda*, *i.e. cut.*

Indian elements in Arabic literature.

What India has contributed reached Bagdad by two different roads. Part has come directly in translations from the Sanskrit, part has travelled through Eran, having originally been translated from Sanskrit (Palî? Prâkṛit?) into Persian, and farther from Persian into

Arabic. In this way, *e.g.* the fables of *Kalîla and Dimna* have been communicated to the Arabs, and a book on medicine, probably the famous *Caraka*. *Cf.* Fihrist, p. 303.

In this communication between India and Bagdad we must not only distinguish between two different roads, but also between two different periods.

As Sindh was under the actual rule of the Khalif Mansûr (A.D. 753-774), there came embassies from that part of India to Bagdad, and among them scholars, who brought along with them two books, the *Brahmasiddhânta* of Brahmagupta (Sindhind), and his *Khaṇḍakhâdyaka* (Arkand). With the help of these pandits, Alfazârî, perhaps also Yakûb Ibn Târik, translated them. Both works have been largely used, and have exercised a great influence. It was on this occasion that the Arabs first became acquainted with a scientific system of astronomy. They learned from Brahmagupta earlier than from Ptolemy.

Another influx of Hindu learning took place under Harun, A.D. 786-808. The ministerial family Barmak, then at the zenith of their power, had come with the ruling dynasty from Balkh, where an ancestor of theirs had been an official in the Buddhistic temple *Naubehâr*, i.e. *nava vihâra* = the new temple (or monastery). The name Barmak is said to be of Indian descent, meaning *paramaka*, *i.e.* the superior (abbot of the *vihâra?*). *Cf.* Kern, *Geschichte des Buddhismus in Indien*, ii. 445, 543. Of course, the Barmak family had been converted, but their contemporaries never thought much of their profession of Islam, nor regarded it as genuine. Induced probably by family traditions, they sent scholars to India, there to study medicine and pharmacology. Besides, they engaged Hindu scholars to come to Bagdad, made them the chief physicians of their hospitals, and ordered them to translate from Sanskrit into Arabic books on medicine, pharmacology, toxicology, philosophy, astrology, and other subjects. Still in later centuries Muslim scholars sometimes travelled for the same purposes as the emissaries of the Barmak, *e.g.* Almuwaffak not long before Alberuni's time (*Codex Vindobonensis, sive medici Abu Mansur liber fundamentorum pharmacologiæ*, ed. Seligmann, Vienna, 1859, pp. 6, 10, and 15, 9).

Soon afterwards, when Sindh was no longer politically dependent upon Bagdad, all this intercourse ceased entirely. Arabic literature turned off into other channels. There is no more mention of the presence of Hindu scholars at Bagdad nor of translations of the Sanskrit. Greek learning had already won an omnipotent sway over the mind of the Arabs, being communicated to them by the labours of Nestorian physicians, the philosophers of Harrân, and Christian scholars in Syria and other parts of the Khalifate. Of the more ancient or Indo-Arabian stratum of scientific literature nothing has reached our time save a number of titles of books, many of them in such a corrupt form as to baffle all attempts at decipherment.

Among the Hindu physicians of this time one ابن دهن is mentioned, *i.e. the son of DHN*, director of the hospital of the Barmaks in Bagdad. This name may be *Dhanya* or *Dhanin*, chosen probably on account of its etymological relationship with the name *Dhanvantari*, the name of the mythical physician of the gods in Manu's law-book and the epos (*cf.* A. Weber, *Indische Litteraturgeschichte*, pp. 284, 287). A similar relation seems to exist between the names *Kaṅka*, that of a physician of the same period, and *Kâṅkâyana*, an authority in Indian medicine (*cf.* Weber, *l. c.*, pp. 287 note, and 284 note, 302).

The name اطر, that of an author of a book on drinkables, may be identical with *Atri*, mentioned as a medical author by Weber, *l. c.*, p. 288.

There was a book by one سنه (also written سنة) on wisdom or philosophy (*cf.* Fihrist, p. 305). According to Middle-Indian phonetics this name is = *vedavyâsa.*[1] A man of this name, also called *Vyâsa* or *Bâdarâyaṇa*, is, according to the literary tradition of India, the originator of the Vedânta school of philosophy (*cf.* Colebroke, Essays, i. 352), and this will remind the reader that in the Arabian Sufism the Indian Vedânta philosophy reappears.

Further, an author صادبرم, *Sadbrm*,[2] is mentioned, unfortunately without an indication of the contents of his book. Alberuni (i. 157) mentions one *Satya* as the author of a *jâtaka* (*cf.* Weber, *l. c.*, p. 278), and this name is perhaps an abbreviation of that one here mentioned, *i.e.* *Satyavarman.*

A work on astrology is attributed to one سنجهل, *SNGHL* (*vide* Fihrist, p. 271), likewise enumerated by Alberuni in a list of names (i. 158). The Indian equivalent of this name is not certain (*cf.* note to i. 158).

There is also mentioned a book on the signs of swords by one باجهر, probably identical with *Vyâghra*, which occurs as a name of Indian authors (*cf.* Fihrist, p. 315).

The famous Buddha legend in Christian garb, most commonly called *Joasaph and Barlaam*, bears in Fihrist, p. 300, the title بوداسف و بلوهر. The former word is generally explained as *Bodhisattva*, although there is no law in Indian phonetics which admits the change of *sattva* to *saf.* The second name is that of Buddha's spiritual teacher and guide, in fact, his *purohita*, and with this word I am inclined to identify the signs in question, *i.e.* بلوهد.

What Ibn Wâḍiḥ in his chronicle (ed. by Houtsma) relates of India, on pp. 92–106, is not of much value. His words on p. 105, "the king كوش = *Ghosha*, who lived in the time of Sindbâd the sage, and this *Ghosha* composed the book on the cunning of the women," are perhaps an indication of some fables of Buddhaghosha having been translated into Arabic.

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[1] Benfey in *Kalilag und Damnag*, *Einleitung*, p. xliii. note 3. The word has received currency in the form *Bidpai.*

[2] *Cf.* Benfey, *l. c.*, *Einleitung*, p. xl.

Besides books on astronomy, mathematics (الحساب الهندى), astrology, chiefly *jâtakas*, on medicine and pharmacology, the Arabs translated Indian works on snakes (*sarpavidyâ*), on poison (*vishavidyâ*), on all kinds of auguring, on talismans, on the veterinary art, *de arte amandi*, numerous tales, a life of Buddha, books on logic and philosophy in general, on ethics, politics, and on the science of war. Many Arab authors took up the subjects communicated to them by the Hindus and worked them out in original compositions, commentaries, and extracts. A favourite subject of theirs was Indian mathematics, the knowledge of which became far spread by the publications of Alkindî and many others.

The smaller dynasties which in later times tore the sovereignty over certain eastern countries of the Khalifate out of the hands of the successors of Mansûr and Harun, did not continue their literary commerce with India. The Banû-Laith (A.D. 872–903), owning great part of Afghanistan together with Ghazna, were the neighbours of Hindus, but their name is in no way connected with the history of literature. For the Buyide princes who ruled over Western Persia and Babylonia between A.D. 932 and 1055, the fables of Kalila and Dimna were translated. Of all these princely houses, no doubt, the Samanides, who held almost the whole east of the Khalifate under their sway during 892–999, had most relations with the Hindus, those in Kabul, the Panjab, and Sindh; and their minister, Aljaihânî, probably had collected much information about India. Originally the slave of the Samanides, then their general and provincial governor, Alptagin made himself practically independent in Ghazna a few years before Alberuni was born, and his successor, Sabuktagîn, Mahmûd's father, paved the road for the war with India (i. 22), and for the lasting establishment of Islam in India.

The author study of India before he wrote the present book.

Some of the books that had been translated under the first Abbaside Khalifs were extant in the library of Alberuni when he wrote the *'Ινδικά*, the *Brahmasiddhânta* or *Sindhind*, and the *Khaṇḍakhâdyaka* or *Arkand* in the editions of Alfazârî and of Yakûb Ibn Târik, the *Caraka* in the edition of 'Alî Ibn Zain, and the *Pañcatantra* or *Kalîla and Dimna*. He also used an Arabic translation of the *Karaṇasâra* by Vitteśvara (ii. 55), but we do not learn from him whether this was an old translation or a modern one made in Alberuni's time. These books offered to Alberuni—he complains of it repeatedly—the same difficulties as to us, viz., besides the faults of the translators, a considerable corruption of the text by the negligence of the copyists, more particularly as regards the proper names.

When Alberuni entered India, he probably had a good general knowledge of Indian mathematics, astronomy, and chronology, acquired by the study of Brahmagupta and his Arabian editors. What Hindu author was his teacher and that of the Arabs in pure mathematics (الحساب الهندى) is not known. Besides Alfazârî and Yakûb Ibn Târik, he learned from Alkhwârizmî, something from Abulhasan of Ahwâz, things of little value from Alkindî and Abû-Ma'shar of Balkh, and single details from the famous book of Aljaihânî. Of other sources which he has used in the *'Ινδικά*, he quotes: (1.) A Muhammadan canon called *Alharkan*, i.e. *ahargaṇa*. I cannot trace the history of the book, but suppose that it was a practical handbook of chronology for the purpose of converting Arabian and Persian dates into Indian ones and *vice versâ*, which had perhaps been necessitated by the wants of the administration under Sabuktagîn and Mahmûd. The name of the author is not mentioned. (2.) Abû Ahmad Ibn Catlaghtagîn, quoted i. 317 as having computed the latitudes of Karlî and Tâneshar.

Two other authorities on astronomical subjects are quoted, but not in relation to Indian astronomy, Muhammad Ibn Ishâk, from *Sarakhs*, ii. 15, and a book called *Ghurrat-alzîjât*, perhaps derived from an Indian source, as the name is identical with *Karaṇatilaka*. The author is perhaps Abû-Muhammad Alnâib from Âmul (*cf.* note to ii. 90.)

In India Alberuni recommenced his study of Indian astronomy, this time not from translations, but from Sanskrit originals, and we here meet with the remarkable fact that the works which about A.D. 770 had been the standard in India still held the same high position A.D. 1020, viz., the works of Brahmagupta. Assisted by learned pandits, he tried to translate them, as also the *Pulisasiddhânta* (*vide* preface to the edition of the text, § 5), and when he composed the *'Ινδικά*, he had already come forward with several books devoted to special points of Indian astronomy. As such he quotes:—

(1.) A treatise on the determination of the lunar stations or *nakshatras*, ii. 83.

(2.) The *Khayâl-alkusûfaini*, which contained, probably beside other things, a description of the *Yoga* theory, ii. 208.

(3.) A book called *The Arabic Khaṇḍakhâdyaka*, on the same subject as the preceding one, ii. 208.

(4.) A book containing a description of the *Karaṇas*, the title of which is not mentioned, ii. 194.

(5.) A treatise on the various systems of numeration, as used by different nations, i. 174, which probably described also the related Indian subjects.

(6.) A book called "Key of Astronomy," on the question whether the sun rotates round the earth or the earth round the sun, i. 277. We may suppose that in this book he had also made use of the notions of Indian astronomers.

(7.) Lastly, several publications on the different methods for the computation of geographical longitude, i. 315. He does not mention their titles, nor whether they had any relation to Hindu methods of calculation.

Perfectly at home in all departments of Indian astronomy and chronology, he began to write the *'Ινδικά*. In the chapters on these subjects he continues a literary movement which at his time had already gone on for centuries; but he surpassed his predecessors by going back upon the original Sanskrit sources, trying to check his pandits by whatever Sanskrit he had contrived to learn, by making new and more accurate translations, and by his conscientious method of testing the data of the Indian astronomers by calculation. His work represents a scientific *renaissance* in comparison with the aspirations of the scholars working in Bagdad under the first Abbaside Khalifs.

Alberuni seems to think that Indian astrology had not been transferred into the more ancient Arabic literature, as we may conclude from his introduction to Chapter lxxx.: "Our fellow-believers in these (Muslim) countries are not acquainted with the Hindu methods of astrology, and have never had an opportunity of studying an Indian book on the subject," ii. 211. We cannot prove that the works of Varâhamihira, *e.g.* his *Brihatsaṁhitâ* and *Laghujâtakam*, which Alberuni was translating, had already been accessible to the Arabs at the time of Mansûr, but we are inclined to think that Alberuni's judgment on this head is too sweeping, for books on astrology, and particularly on *jâtaka*, had already been translated in the early days of the Abbaside rule. *Cf.* Fihrist, pp. 270, 271.

As regards Indian medicine, we can only say that Alberuni does not seem to have made a special study of it, for he simply uses the then current translation of

Caraka, although complaining of its incorrectness, i. 159, 162, 382. He has translated a Sanskrit treatise on loathsome diseases into Arabic (*cf.* preface to the edition of the original, p. xxi. No. 18), but we do not know whether before the *'Ινδικά* or after it.

What first induced Alberuni to write the *'Ινδικά* was not the wish to enlighten his countrymen on Indian astronomy in particular, but to present them with an impartial description of the Indian theological and philosophical doctrines on a broad basis, with every detail pertaining to them. So he himself says both at the beginning and end of the book. Perhaps on this subject he could give his readers more perfectly new information than on any other, for, according to his own statement, he had in this only one predecessor, Aleranshahrî. Not knowing him or that authority which *he* follows, *i.e.* Zurḳân, we cannot form an estimate as to how far Alberuni's strictures on them (i. 7) are founded. Though there can hardly be any doubt that Indian philosophy in one or other of its principal forms had been communicated to the Arabs already in the first period, it seems to have been something entirely new when Alberuni produced before his compatriots or fellow-believers the *Sâṁkhya* by Kapila, and the *Book of Patañjali* in good Arabic translations. It was this particular work which admirably qualified him to write the corresponding chapters of the *'Ινδικά*. The philosophy of India seems to have fascinated his mind, and the noble ideas of the *Bhagavadgîtâ* probably came near to the standard of his own persuasions. Perhaps it was he who first introduced this gem of Sanskrit literature into the world of Muslim readers.

As regards the Purâṇas, Alberuni was perhaps the first Muslim who took up the study of them. At all events, we cannot trace any acquaintance with them on the part of the Arabs before his time. Of the literature of fables, he knew the *Pañcatantra* in the Arabic edition of Ibn Almukaffa.

Judging Alberuni in relation to his predecessors, we come to the conclusion that his work formed a most marked progress. His description of Hindu philosophy was probably unparalleled. His system of chronology and astronomy was more complete and accurate than had ever before been given. His communications from the Purâṇas were probably entirely new to his readers, as also the important chapters on literature, manners, festivals, actual geography, and the much-quoted chapter on historic chronology. He once quotes Râzî, with whose works he was intimately acquainted, and some Sûfî philosophers, but from neither of them could he learn much about India.

His Sanskrit sources.

In the following pages we give a list of the Sanskrit books quoted in the *ʼΙνδικά*:—

Sources of the chapters on theology and philosophy: *Sâṁkhya*, by Kapila; *Book of Patañjali; Gîtâ*, *i.e.* some edition of the *Bhagavadgîtâ*.

He seems to have used more sources of a similar nature, but he does not quote from them.

Sources of a Paurânic kind: *Vishṇu-Dharma, Vishṇu-Purâṇa, Matsya-Purâṇa, Vâyu-Purâṇa, Âditya-Purâṇa.*

Sources of the chapters on astronomy, chronology, geography, and astrology: *Pulisasiddhânta; Brahmasiddhânta, Khaṇḍakhâdyaka, Uttarakhaṇḍakhâdyaka*, by Brahmagupta; Commentary of the *Khaṇḍakhâdyaka*, by Balabhadra, perhaps also some other work of his; *Brihatsaṁhitâ, Pañcasiddhântikâ, Brihat-jâtakam, Laghu-jâtakam*, by Varâhamihira; Commentary of the *Brihatsaṁhitâ*, a book called *Srûdhava* (perhaps *Sarvadhara*), by Utpala, from Kashmîr; a book by Âryabhaṭa, junior; *Karaṇasâra*, by Vitteśvara; *Karaṇatilaka*, by Vijayanandin; *Śrîpâla; Book of the Ṛishi* (sic) *Bhuvanakośa; Book of the Brâhman Bhaṭṭila; Book of Durlabha*, from Multan; *Book of Jîvaśarman; Book of Samaya; Book of Auliatta* (?), the son of Sahâwî (?); *The Minor Mânasa,* by Puñcala; *Srûdhava* (*Sarvadhara?*), by Mahâdeva Candrabîja; Calendar from Kashmîr.

As regards some of these authors, Śrîpâla, Jîvaśarman, Samaya (?), and Auliatta (?), the nature of the quotations leaves it uncertain whether Alberuni quoted from books of theirs or from oral communications which he had received from them.

Source on medicine: *Caraka,* in the Arabic edition of 'Alî Ibn Zain, from Tabaristan.

In the chapter on metrics, a lexicographic work by one Haribhaṭa (?), and regarding elephants a "Book on the Medicine of Elephants," are quoted.

His communications from the *Mahâbhârata* and *Râmâyaṇa,* and the way in which he speaks of them, do not give us the impression that he had these books before him. He had some information of Jaina origin, but does not mention his source (Âryabhaṭa, jun.?) Once he quotes Manu's *Dharmaśâstra,* but in a manner which makes me doubt whether he took the words directly from the book itself.[1]

The quotations which he has made from these sources are, some of them, very extensive, *e.g.* those from the *Bhagavadgîtâ.* In the chapter on literature he mentions many more books than those here enumerated, but does not tell us whether he made use of them for the *'Ινδικά.* Sometimes he mentions Hindu individuals as his informants, *e.g.* those from Somanâth, i. 161, 165, and from Kanoj, i. 165; ii. 129.

In Chapter i. the author speaks at large of the radical difference between Muslims and Hindus in everything, and tries to account for it both by the history of India and by the peculiarities of the national character of its inhabitants (i. 17 *seq.*). Everything in India is just the reverse of what it is in Islam, "and if ever a custom of theirs resembles one of ours, it has certainly just the opposite meaning" (i. 179). Much more certainly than to Alberuni, India would seem a land of wonders and monstrosities to most of his readers. Therefore, in order to show that there were other nations who held and hold similar notions, he compares Greek philosophy, chiefly that of Plato, and tries to illustrate Hindu notions by those of the Greeks, and thereby to bring them nearer to the understanding of his readers.

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[1] The places where mention of these books occurs are given in Index I. *Cf.* also the annotations on single cases.

Greek and other parallels.

The rôle which Greek literature plays in Alberuni's work in the distant country of the Paktyes and Gandhari is a singular fact in the history of civilisation. Plato before the doors of India, perhaps in India itself! A considerable portion of the then extant Greek literature had found its way into the library of Alberuni, who uses it in the most conscientious and appreciative way, and takes from it choice passages to confront Greek thought with Indian. And more than this: on the part of his readers he seems to presuppose not only that they were acquainted with them, but also gave them the credit of first-rate authorities. Not knowing Greek or Syriac, he read them in Arabic translations, some of which reflect much credit upon their authors. The books he quotes are these:—

Plato, *Phædo*.
    Timæus, an edition with a commentary.
    Leges. In the copy of it there was an appendix relating to the pedigree of Hippokrates.
Proclus, Commentary on *Timæus* (different from the extant one).
Aristotle, only short references to his *Physica* and *Metaphysica*.
    Letter to Alexander.
Johannes Grammaticus, *Contra Proclum*.
Alexander of Aphrodisias, Commentary on Aristotle's φυσικὴ ἀκρόασις.
Apollonius of Tyana.
Porphyry, *Liber historiarum philosophorum* (?).
Ammonius.

Aratus, *Phænomena*, with a commentary.
Galenus, *Protrepticus.*
    περὶ συνϑέσεως φαρμάκων τῶν κατὰ τόπους.
    περὶ συνϑέσεως φαρμάκων κατὰ γένη.
    Commentary on the Apophthegms of Hippokrates.
    De indole animæ.
    Book of the Proof.
Ptolemy, *Almagest.*
    Geography.
    Kitâb-almanshûrât.
Pseudo-Kallisthenes, Alexander romance.
Scholia to the *Ars grammatica* of Dionysius Thrax.
A synchronistic history, resembling in part that of Johannes Malalas, in part the *Chronicon* of Eusebius. *Cf.* notes to i. 112, 105.

The other analogies which he draws, not taken from Greek, but from Zoroastrian, Christian, Jewish, Manichæan, and Sûfî sources, are not very numerous. He refers only rarely to Eranian traditions; *cf.* Index II. (Persian traditions and Zoroastrian). Most of the notes on Christian, Jewish, and Manichæan subjects may have been taken from the book of Erânshahrî (*cf.* his own words, i. 6, 7), although he knew Christianity from personal experience, and probably also from the communications of his learned friends Abulkhair Alkhammâr and Abû-Sahl Almasîḥî, both Christians from the farther west (*cf. Chronologie Orientalischer Völker, Einleitung*, p. xxxii.). The interest he has in Mânî's doctrines and books seems rather strange. We are not acquainted with the history of the remnants of Manichæism in those days and countries, but cannot help thinking that the quotations from Mânî's "Book of Mysteries" and *Thesaurus Vivificationis* do not justify Alberuni's judgment in this direction. He seems to have seen in them venerable documents of a high antiquity, instead of the syncretistic ravings of a would-be prophet.

That he was perfectly right in comparing the Sûfî philosophy—he derives the word from *σοφία*, i. 33—

with certain doctrines of the Hindus is apparent to any one who is aware of the essential identity of the systems of the Greek Neo-Pythagoreans, the Hindu Vedânta philosophers, and the Sûfîs of the Muslim world. The authors whom he quotes, Abû Yazîd Albistâmî and Abû Bakr Alshiblî, are well-known representatives of Sufism. *Cf.* note to i. 87, 88.

As far as the present state of research allows one to judge, the work of Alberuni has not been continued. In astronomy he seems by his *Canon Masudicus* to represent the height, and at the same time the end, of the independent development of this science among the Arabs. But numerous scholars toiled on in his wake, whilst in the study of India, and for the translation of the standard works of Sanskrit literature, he never had a successor before the days of the Emperor Akbar. There followed some authors who copied from his *'Ινδικά*, but there was none who could carry on the work in *his* spirit and method after he had died, eighteen years after the composition of the *'Ινδικά*. We must here mention two authors who lived not long after him, under the same dynasty, and probably in the same place, Ghazna, viz., Gardêzî (*cf.* note to ii. 6), who wrote between A.D. 1049 and 1052, and Muhammad Ibn 'Ukail, who wrote between A.D. 1089 and 1099 (*cf.* note to i. 5). Of the later authors who studied Alberuni's *'Ινδικά* and copied from it, the most notorious is Rashîd-aldîn, who transferred, *e.g.* the whole geographical Chapter xviii. into his huge chronicle.

India at the author's time.

When Alberuni entered India, times were not favourable for opening friendly relations with native scholars. India recoiled from the touch of the impure barbarians. The Pâla dynasty, once ruling over Kabulistan and the Panjab, had disappeared from the theatre of history, and their former dominions were in the firm grasp of King Mahmûd and under the administration of his slaves, of Turkish descent. The princes of North-Western

India had been too narrow-minded, too blind in their self-conceit, duly to appreciate the danger threatening from Ghazna, and too little politic in due time to unite for a common defence and repulse of the enemy. Single-handed Ânandapâla had had to fight it out, and had succumbed; but the others were to follow, each one in his turn. All those who would not bear the yoke of the *mlecchas* fled and took up their abode in the neighbouring Hindu empires.

Kashmîr was still independent, and was hermetically sealed to all strangers (i. 206). Ânandapâla had fled there. Mahmûd had tried the conquest of the country, but failed. About the time when Alberuni wrote, the rule passed from the hands of Saṅgrâmadeva, A.D. 1007–1030, into those of Anantadeva, A.D. 1030–1082.

Central and Lower Sindh were rarely meddled with by Mahmûd. The country seems to have been split into minor principalities, ruled by petty Muslim dynasties, like the Karmatian dynasty of Multan, deposed by Mahmûd.

In the conditions of the Gurjara empire, the capital of which was Anhilvâra or Pattan, the famous expedition of Mahmûd to Somanâth, A.D. 1025, in some ways resembling that of Napoleon to Moscow, does not seem to have produced any lasting changes. The country was under the sway of the Solanki dynasty, who in A.D. 980 had taken the place of the Câlukyas. King Câmuṇḍa fled before Mahmûd, who raised another prince of the same house, Devaśarman, to the throne; but soon after we find a son of Câmuṇḍa, Durlabha, as king of Gurjara till A.D. 1037.

Mâlava was ruled by the Prâmâra dynasty, who, like the kings of Kashmîr, had afforded a refuge to a fugitive prince of the Pâla dynasty of Kabulistan. Bhojadeva of Mâlava, ruling between A.D. 997 and 1053, is mentioned by Alberuni. His court at Dhâr, where he had gone from Ujjain, was a rendezvous of the scholars of the time.

Kanoj formed at that time part of the realm of the Pâla princes of Gauḍa or Bengal, who resided in Mongîr. During the reign of Râjyapâla, Kanoj had been plundered and destroyed by Mahmûd, A.D. 1017, in consequence of which a new city farther away from the *mlecchas*, Bârî, had been founded, but does not seem to have grown to any importance. Residing in this place, the King Mahîpâla tried about A.D. 1026 to consolidate and to extend his empire. Both these rulers are said to have been Buddhists. *Cf.* Kern, *Geschichte des Buddhismus in Indien*, ii. 544.

The centres of Indian learning were Benares and Kashmîr, both inaccessible to a barbarian like Alberuni (i. 22), but in the parts of India under Muslim administration he seems to have found the pandits he wanted, perhaps also at Ghazna among the prisoners of war.

The auth and Buddhism.

India, as far as known to Alberuni, was Brahmanic, not Buddhistic. In the first half of the eleventh century all traces of Buddhism in Central Asia, Khurâsân, Afghanistan, and North-Western India seem to have disappeared; and it is a remarkable fact that a man of the inquisitive mind of Alberuni knew scarcely anything at all about Buddhism, nor had any means for procuring information on the subject. His notes on Buddhism are very scanty, all derived from the book of Eranshahrî, who, in his turn, had copied the book of one Zurkân, and this book he seems to indicate to have been a bad one. *Cf.* i. 7, 249, 326.

Buddha is said to be the author of a book called *Cûḍâmaṇi* (not *Gûḍhâmana*, as I have written, i. 158), *i.e.* Jewel, on the knowledge of the supranaturalistic world.

The Buddhists or Shamanians, *i.e.* *śramaṇa*, are called *Muḥammira*, which I translate the *red-robe wearers*, taking it for identical with *raktapaṭa*. *Cf.* note to i. 21.

Mentioning the trinity of the Buddhistic system, *buddha, dharma, saṅgha*, he calls Buddha *Buddhodana*, which is a mistake for something like *the son of Śuddhodana*. *Cf.* note to i. 40 and i. 380, which latter passage is probably derived from the *Vishṇu-Dharma* (on which *vide* note to i. 54).

Of Buddhistic authors there are mentioned Candra, the grammarian, i. 135 (*cf.* Kern, *Geschichte des Buddhismus in Indien*, ii. 520), Sugrîva, the author of an astronomical work, and a pupil of his, i. 156.

Of the manners and customs of the Buddhists, only their practice of disposing of their dead by throwing them into flowing water is mentioned, ii. 169.

Alberuni speaks (ii. 11) of a building erected by King Kanishka in Peshavar, and called *Kanishkacaitya*, as existing in his time, most likely identical with that *stûpa* which he is reported to have built in consequence of a prophecy of no less a person than Buddha himself. *Cf.* Kern, *l. c.*, ii. 187. The word *bihâr*, *i.e.* *vihâra*, which Alberuni sometimes uses in the meaning of temple and the like, is of Buddhistic origin. *Cf.* Kern, *l. c.*, ii. 57.

Among the various kinds of writing used in India, he enumerates as the last one the "*Bhaikshukî, used in Udunpûr in Pûrvadeśa. This last is the writing of Buddha*," i. 173. Was this Udunpûr (we may also read *Udannapûr*) the Buddhistic monastery in Magadha, *Udaṇḍapurî*, that was destroyed by the Muslims, A.D. 1200? *Cf.* Kern, *l. c.*, ii. 545.

The kosmographic views of the Buddhists, as given by Alberuni, i. 249, 326, ought to be examined as to their origin. Perhaps it will be possible to point out the particular Buddhistic book whence they were taken.

He speaks twice of an antagonism between Buddha and Zoroaster.

If Alberuni had had the same opportunity for travelling in India as Hiouen-Tsang had, he would easily have collected plenty of information on Buddhism.

Considering the meagreness of his notes on this subject, we readily believe that he never found a Buddhistic book, and never knew a Buddhist "from whom I might have learned their theories," i. 249. His Brahman pandits probably knew enough of Buddhism, but did not choose to tell him.

Lastly, India, as known to Alberuni, was in matters of religion Vishnuitic (*vaishnava*), not Sivaitic (*śaiva*). Vishṇu, or Nârâyaṇa, is the first god in the pantheon of his Hindu informants and literary authorities, whilst Śiva is only incidentally mentioned, and that not always in a favourable manner. This indicates a remarkable change in the religious history of those countries. For the predecessors of Mahmûd in the rule over Kabulistan and the Panjâb, the Pâla dynasty, were worshippers of Śiva (*cf.* Lassen, *Indische Alterthumskunde*, 3, 895), as we may judge from their coins, adorned with the image of Nanda, the ox of Śiva, and from the etymology of their names. *Cf.* note to ii. 13, and Lassen, *l. c.*, 3, 915. The image of Nanda reappears a second time on the coins of the last of the descendants of King Mahmûd on the throne of Ghazna.

CONCLUSION.

It was in the summer of 1883 that I began to work at the edition and translation of the *'Ινδικά*, after having fulfilled the literary duties resulting from my journey in Syria and Mesopotamia in 1879 and 1880. A copy of the Arabic manuscript had been prepared in 1872, and collated in Stambul in the hot summer months of 1873.

In order to test my comprehension of the book, I translated it into German from beginning to end between February 1883 and February 1884. In the summer of the latter year the last hand was laid to the constitution of the Arabic text as it was to be printed.

In 1885–86 the edition of the Arabic original was printed. At the same time I translated the whole book a second time, into English, finishing the translation of every single sheet as the original was carried through the press.

In 1887 and the first half of 1888 the English translation, with annotations and indices, was printed.

My work during all these years was not uninterrupted.

Translating an Arabic book, written in the style of Alberuni, into English, is, for a person to whom English is not his mother-tongue, an act of temerity, which, when I was called upon to commit it, gravely affected my conscience to such a degree that I began to falter, and seriously thought of giving up the whole thing altogether. But then there rose up before "my mind's eye" the venerable figure of old MacGuckin de Slane, and as he had been gathered to his fathers, I could not get back the word I had given him. *Cf.* preface to the edition of the Arabic text, p. viii. Assuredly, to do justice to the words of Alberuni would require a command over English like that of Sir Theodore Martin, the translator of "Faust," or Chenery, the translator of *Harírí.*

As regards my own translation, I can only say I have tried to find common sense in the author's language, and to render it as clearly as I could. In this I was greatly assisted by my friend the Rev. Robert Gwynne, Vicar of St. Mary's, Soho, London, whose training in Eastern languages and literature qualified him to co-operate in revising the entire manuscript and correcting the proof sheets.

Perhaps it will not be superfluous to point out to the reader who does not know Arabic that this language sometimes exhibits sentences perfectly clear as to the meaning of every single word and the syntactic construction, and nevertheless admitting of entirely different interpretations. Besides, a first translator who steers out on such a sea, like him who first tries to explain a difficult, hardly legible inscription, exposes himself to many dangers which he would easily have avoided had kind fortune permitted him to follow in the wake of other explorers. Under these circumstances, I do not flatter myself that I have caught the sense of the author everywhere, and I warn the reader not to take a translation, in particular a first translation, from Arabic for more than it is. It is nothing absolute, but only relative in many respects; and if an Indianist does not find good Indian thought in my translation, I would advise him to consult the next Arabic philologist he meets. If the two can obtain a better insight into the subject-matter, they are very likely to produce a better rendering of the words.

My annotations do not pretend to be a running commentary on the book, for that cannot be written except by a professed Indianist. They contain some information as to the sources used by Alberuni, and as to those materials which guided me in translating. On the phonetic peculiarities of the Indian words as transcribed by Alberuni, the reader may compare a treatise of mine called *Indo-Arabische Studien*, and presented to the Royal Academy of Berlin on 21st June of this year.

My friend Dr. Robert Schram, of the University of Vienna, has examined all the mathematical details of chronology and astronomy. The results of his studies are presented to the reader in the annotations signed with his name. All this is Dr. Schram's special domain, in which he has no equal. My thanks are due to him for lending me his help in parts of the work where my own attempts at verification, after prolonged exertions in the same direction, proved to be insufficient.

Of the two indices, the former contains all words of Indian origin occurring in the book, some pure Sanskrit, some vernacular, others in the form exhibited by the

Arabic manuscript, howsoever faulty it may be. The reader will perhaps here and there derive some advantage from comparing the index of the edition of the Arabic original. The second index contains names of persons and places, &c., mostly of non-Indian origin.

It was the Committee of the Oriental Translation Fund, consisting at the time of Osmond de Beauvoir Priaulx, Edward Thomas, James Fergusson, Reinhold Rost, and Theodore Goldstücker, who first proposed to me to translate the *'Ινδικά*. Thomas, Goldstücker, and Fergusson are beyond the reach of human words, but to O. de Beauvoir Priaulx, Esq., and to Dr. Rost, I desire to express my sincerest gratitude for the generous help and the untiring interest which they have always accorded to me, though so many years have rolled on since I first pledged to them my word. Lastly, Her Majesty's India Office has extended its patronage from the edition of the Arabic original also to this edition of the work in an English garb.

Of the works of my predecessors, the famous publication of Reinaud, the *Mémoire géographique, historique et scientifique sur l'Inde*, Paris, 1849, has been most useful to me. Cf. on this and the labours of my other predecessors § 2 of the preface to the edition of the Arabic original.

The Sanskrit alphabet has been transliterated in the following way:—*a, â, i, î, u, û—ṛi, ai, au—k, kh, g, gh, ṅ—c, ch, j, jh, ñ—ṭ, ṭh, ḍ, ḍh, ṇ—t, th, d, dh, n—p, ph, b, bh, m—y, r, l, v—ś, s̄h, s, h.*

EDWARD SACHAU.

BERLIN, *August* 4, 1888.

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ALBÊRÛNÎ'S INDIA

AN

ACCURATE DESCRIPTION OF ALL CATEGORIES OF HINDU THOUGHT,

AS WELL THOSE WHICH ARE ADMISSIBLE AS THOSE WHICH MUST BE REJECTED.

COMPOSED BY

'ABÛ-ALRAIḤÂN MUḤAMMAD IBN 'AḤMAD

ALBÊRÛNÎ.

PREFACE.

IN THE NAME OF GOD, THE COMPASSIONATE, THE MERCIFUL.

Page 2.

1. On tradition, hearsay and eye-witness. 2. The different kinds of reporters. 3. Praise of truthfulness.

No one will deny that in questions of historic authenticity *hearsay* does not equal *eye-witness;* for in the latter the eye of the observer apprehends the substance of that which is observed, both in the time when and in the place where it exists, whilst hearsay has its peculiar drawbacks. But for these, it would even be preferable to eye-witness; for the object of eye-witness can only be *actual* momentary existence, whilst hearsay comprehends alike the present, the past, and the future, so as to apply in a certain sense both to that which *is* and to that which is *not* (*i.e.* which either has ceased to exist or has not yet come into existence). Written tradition is one of the species of hearsay—we might almost say, the most preferable. How could we know the history of nations but for the everlasting monuments of the pen?

The tradition regarding an event which in itself does not contradict either logical or physical laws will invariably depend for its character as true or false upon the character of the reporters, who are influenced by the divergency of interests and all kinds of animosities and antipathies between the various nations. We must distinguish different classes of reporters.

One of them tells a lie, as intending to further an interest of his own, either *by lauding* his family or nation, because he is one of them, or *by attacking* the family or nation on the opposite side, thinking that thereby he can gain his ends. In both cases he acts from motives of objectionable cupidity and animosity.

Another one tells a lie regarding a class of people whom he likes, as being under obligations to them, or whom he hates because something disagreeable has happened between them. Such a reporter is near akin to the first-mentioned one, as he too acts from motives of personal predilection and enmity.

Another tells a lie because he is of such a base nature as to aim thereby at some profit, or because he is such a coward as to be afraid of telling the truth.

Another tells a lie because it is his nature to lie, and he cannot do otherwise, which proceeds from the essential meanness of his character and the depravity of his innermost being.

Lastly, a man may tell a lie from ignorance, blindly following others who told him.

If, now, reporters of this kind become so numerous as to represent a certain body of tradition, or if in the course of time they even come to form a consecutive series of communities or nations, both the first reporter and his followers form the connecting links between the hearer and the inventor of the lie; and if the connecting links are eliminated, there remains the originator of the story, one of the various kinds of liars we have enumerated, as the only person with whom we have to deal.

That man only is praiseworthy who shrinks from a lie and always adheres to the truth, enjoying credit even among liars, not to mention others.

It has been said in the Koran, "*Speak the truth, even if it were against yourselves*" (Sûra, 4, 134); and the Messiah
Page 3. expresses himself in the Gospel to this effect: "*Do not mind the fury of kings in speaking the truth before them.*

They only possess your body, but they have no power over your soul" (*cf.* St. Matt. x. 18, 19, 28; St. Luke xii. 4). In these words the Messiah orders us to exercise *moral courage.* For what the crowd calls courage—bravely dashing into the fight or plunging into an abyss of destruction—is only a *species* of courage, whilst the *genus*, far above all *species*, is *to scorn death*, whether by word or deed.

Now as justice (*i.e.* being just) is a quality liked and coveted for its own self, for its intrinsic beauty, the same applies to *truthfulness*, except perhaps in the case of such people as never tasted how sweet it is, or know the truth, but deliberately shun it, like a notorious liar who once was asked if he had ever spoken the truth, and gave the answer, "If I were not afraid to speak the truth, I should say, no." A liar will avoid the path of justice; he will, as matter of preference, side with oppression and false witness, breach of confidence, fraudulent appropriation of the wealth of others, theft, and all the vices which serve to ruin the world and mankind.

I. On the defects of Muslim works on religious and philosophical doctrines.

II. Exemplified with regard to the Hindus. Criticism of the book of Eránshahrí.

III. Bérûnî asked to write a book on the subject.

IV. He states his method.

When I once called upon the master 'Abû-Sahl 'Abd-Almun'im Ibn 'Alî Ibn Nûḥ At-tiflisî, may God strengthen him! I found that he blamed the tendency of the author of a book on the Mu'tazila sect to misrepresent their theory. For, according to them, God is omniscient of himself, and this dogma that author had expressed in such a way as to say that *God has no knowledge* (like the knowledge of man), thereby misleading uneducated people to imagine that, according to the Mu'tazilites, *God is ignorant.* Praise be to God, who is far above all such and similar unworthy descriptions! Thereupon I pointed out to the master that precisely the same method is much in fashion among those who undertake the task of giving an account of religious and philosophical systems from which they slightly differ or to which they are entirely opposed. Such misrepresentation is easily detected in a report about dogmas comprehended within the frame of one single religion, because they are closely related and blended with each other. On the other hand, you would have great difficulty in detecting it in a report about entirely foreign systems of thought totally differing both in principle and details, for such a research is rather an out-of-the-way one, and there are few means of arriving at a thorough comprehension of it. The same tendency prevails throughout our whole literature on philosophical and religious sects. If such an author is not alive to the requirements of a strictly scientific method, he will procure some superficial information which will satisfy neither the adherents of the doctrine in question nor those who really know it. In such a case, if he be an honest character, he will simply retract and feel ashamed; but if he be so base as not to give due honour to truth, he will persist in litigious wrangling for his own original standing-point. If, on the contrary, an author has the right method, he will do his utmost to deduce the tenets of a sect from their legendary lore, things which people tell him, pleasant enough to listen to, but which he would never dream of taking for true or believing.

In order to illustrate the point of our conversation,
Page 4. one of those present referred to the religions and doctrines of the Hindus by way of an example. Thereupon I drew their attention to the fact that everything which exists on this subject in our literature is second-hand information which one has copied from the other, a farrago of materials never sifted by the sieve of critical examination. Of all authors of this class, I know only one who had proposed to himself to give a simple and exact report of the subject *sine irâ ac studio*, viz. 'Abû-al'abbâs Alêrânshahrî. He himself did not believe in any of the then existing religions, but was the sole believer in a religion invented by himself, which he tried to propagate. He has given a very good account of the doctrines of the Jews and Christians as well as

of the contents of both the Thora and the Gospel. Besides, he furnishes us with a most excellent account of the Manichæans, and of obsolete religions of bygone times which are mentioned in their books. But when he came in his book to speak of the Hindus and the Buddhists, his arrow missed the mark, and in the latter part he went astray through hitting upon the book of *Zarḳân*, the contents of which he incorporated in his own work. That, however, which he has not taken from *Zarḳân*, he himself has heard from common people among Hindus and Buddhists.

At a subsequent period the master 'Abû-Sahl studied the books in question a second time, and when he found the matter exactly as I have here described it, he incited me to write down what I know about the Hindus as a help to those who want to discuss religious questions with them, and as a repertory of information to those who want to associate with them. In order to please him I have done so, and written this book on the doctrines of the Hindus, never making any unfounded imputations against those, our religious antagonists, and at the same time not considering it inconsistent with my duties as a Muslim to quote their own words at full length when I thought they would contribute to elucidate a subject. If the contents of these quotations happen to be utterly heathenish, and *the followers of the truth, i.e.* the Muslims, find them objectionable, we can only say that such is the belief of the Hindus, and that they themselves are best qualified to defend it.

This book is not a *polemical* one. I shall not produce the arguments of our antagonists in order to refute such of them as I believe to be in the wrong. My book is nothing but *a simple historic record of facts.* I shall place before the reader the theories of the Hindus exactly as they are, and I shall mention in connection with them similar theories of the Greeks in order to show the relationship existing between them. For the

Greek philosophers, although aiming at truth in the abstract, never in all questions of popular bearing rise much above the customary exoteric expressions and tenets both of their religion and law. Besides Greek ideas we shall only now and then mention those of the Ṣûfîs or of some one or other Christian sect, because in their notions regarding the transmigration of souls and the pantheistic doctrine of the unity of God with creation there is much in common between these systems.

I have already translated two books into Arabic, one about the *origines* and a description of all created beings, called *Sâṁkhya*, and another about the emancipation of the soul from the fetters of the body, called *Patañjali* (*Pâtañjala?*). These two books contain most of the elements of the belief of the Hindus, but not all the single rules derived therefrom. I hope that the present book will enable the reader to dispense with these two earlier ones, and with other books of the same kind; that it will give a sufficient representation of the subject, and will enable him to make himself thoroughly acquainted with it—God willing!

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Description of the barriers which separate the Hindus from the Muslims and make it so particularly difficult for a Muslim to study any Indian subject.

Before entering on our exposition, we must form an adequate idea of that which renders it so particularly difficult to penetrate to the essential nature of any Indian subject. The knowledge of these difficulties will either facilitate the progress of our work, or serve as an apology for any shortcomings of ours. For the reader must always bear in mind that the Hindus entirely differ from us in every respect, many a subject appearing intricate and obscure which would be perfectly clear if there were more connection between us. The barriers which separate Muslims and Hindus rest on different causes.

First reason: Difference of the language and its particular nature.

First, they differ from us in everything which other nations have in common. And here we first mention the language, although the difference of language also exists between other nations. If you want to conquer this difficulty (*i.e.* to learn Sanskrit), you will not find it easy, because the language is of an enormous range, both in words and inflections, something like the Arabic, calling one and the same thing by various names, both original and derived, and using one and the same word for a variety of subjects, which, in order to be properly understood, must be distinguished from each other by various qualifying epithets. For nobody could distinguish between the various meanings of a word unless he understands the context in which it occurs, and its relation both to the following and the preceding parts of the sentence. The Hindus, like other people, boast of this enormous range of their language, whilst in reality it is a defect.

Further, the language is divided into a neglected vernacular one, only in use among the common people, and a classical one, only in use among the upper and educated classes, which is much cultivated, and subject to the rules of grammatical inflection and etymology, and to all the niceties of grammar and rhetoric.

Besides, some of the sounds (consonants) of which the language is composed are neither identical with the sounds of Arabic and Persian, nor resemble them in any way. Our tongue and uvula could scarcely manage to correctly pronounce them, nor our ears in hearing to distinguish them from similar sounds, nor could we transliterate them with our characters. It is very difficult, therefore, to express an Indian word in our writing, for in order to fix the pronunciation we must change our orthographical points and signs, and must pronounce the case-endings either according to the common Arabic rules or according to special rules adapted for the purpose.

Add to this that the Indian scribes are careless, and do not take pains to produce correct and well-collated copies. In consequence, the highest results of the author's mental development are lost by their negligence, and his book becomes already in the first or second copy so full of faults, that the text appears as something entirely new, which neither a scholar nor one familiar with the subject, whether Hindu or Muslim, could any longer understand. It will sufficiently illustrate the matter if we tell the reader that we have sometimes written down a word from the mouth of Hindus, taking the greatest pains to fix its pronunciation, and that afterwards when we repeated it to them, they had great difficulty in recognising it.

As in other foreign tongues, so also in Sanskrit, two or three consonants may follow each other without an intervening vowel—consonants which in our Persian grammatical system are considered as having a *hidden* vowel. Since most Sanskrit words and names begin with such consonants without vowels, we find it very difficult to pronounce them.

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Besides, the scientific books of the Hindus are composed in various favourite metres, by which they intend, considering that the books soon become corrupted by additions and omissions, to preserve them exactly as they are, in order to facilitate their being learned by heart, because they consider as canonical only that which is known by heart, not that which exists in writing. Now it is well known that in all metrical compositions there is much misty and constrained phraseology merely intended to fill up the metre and serving as a kind of patchwork, and this necessitates a certain amount of verbosity. This is also one of the reasons why a word has sometimes one meaning and sometimes another.

From all this it will appear that the metrical form of literary composition is one of the causes which make the study of Sanskrit literature so particularly difficult.

Second reason: Their religious prejudices.

Secondly, they totally differ from us in religion, as we believe in nothing in which they believe, and *vice versâ*. On the whole, there is very little disputing about theological topics among themselves; at the utmost, they fight with words, but they will never stake their soul or body or their property on religious controversy. On the contrary, all their fanaticism is directed against those who do not belong to them—against all foreigners. They call them *mleccha, i.e.*, impure, and forbid having any connection with them, be it by intermarriage or any other kind of relationship, or by sitting, eating, and drinking with them, because thereby, they think, they would be polluted. They consider as impure anything which touches the fire and the water of a foreigner; and no household can exist without these two elements. Besides, they never desire that a thing which once has been polluted should be purified and thus recovered, as, under ordinary circumstances, if anybody or anything has become unclean, he or it would strive to regain the state of purity. They are not allowed to receive anybody who does not belong to them, even if he wished it, or was inclined to their religion. This, too, renders any connection with them quite impossible, and constitutes the widest gulf between us and them.

Third reason: The radical difference of their manners and customs.

In the third place, in all manners and usages they differ from us to such a degree as to frighten their children with us, with our dress, and our ways and customs, and as to declare us to be devil's breed, and our doings as the very opposite of all that is good and proper. By the bye, we must confess, in order to be just, that a similar depreciation of foreigners not only prevails among us and the Hindus, but is common to all nations towards each other. I recollect a Hindu who wreaked his vengeance on us for the following reason:—

Some Hindu king had perished at the hand of an enemy of his who had marched against him from our country. After his death there was born a child to him, which succeeded him, by the name of Sagara. On coming of age, the young man asked his mother about his father, and then she told him what had happened. Now he was inflamed with hatred, marched out of his country into the country of the enemy, and plentifully satiated his thirst of vengeance upon them. After having become tired of slaughtering, he compelled the survivors to dress in our dress, which was meant as an ignominious punishment for them. When I heard of it, I felt thankful that he was gracious enough not to compel us to Indianise ourselves and to adopt Hindu dress and manners.

Fourth reason: Aversion of the Buddhists towards the countries of the West, whence they had been expelled. First inroads of the Muslims into India.

Another circumstance which increased the already existing antagonism between Hindus and foreigners is that the so-called Shamaniyya (Buddhists), though they cordially hate the Brahmans, still are nearer akin to them than to others. In former times, Khurâsân, Persis, 'Irâḳ, Mosul, the country up to the frontier of Syria, was Buddhistic, but then Zarathustra went forth from Âdharbaijân and preached Magism in Balkh (Baktra). His doctrine came into favour with King Gushtasp, and his son Isfendiyâd spread the new faith both in east and west, both by force and by treaties. He founded fire-temples through his whole empire, from the frontiers of China to those of the Greek empire. The succeeding kings made their religion (*i.e.* Zoroastrianism) the obligatory state-religion for Persis and 'Irâḳ. In consequence, the Buddhists were banished from those countries, and had to emigrate to the countries east of Balkh. There are some Magians up to the present time in India, where they are called *Maga*. From that time dates their aversion towards the countries of Khurâsân. But then came Islam; the Persian empire perished, and the repugnance of the Hindus against foreigners increased more and more when the Muslims began to make their inroads into their country; for Muḥammad Ibn Elḳâsim Ibn Elmunabbih entered Sindh from the side of Sijistân (Sakastene) and conquered the cities of Bahmanwâ and Mûlasthâna, the former of which he called *Al-manṣûra*, the latter *Al-ma'mûra*. He entered India proper, and penetrated even as far as Kanauj, marched through the country of Gandhâra, and on his way back, through the confines of Kashmîr, sometimes fighting sword in hand, sometimes gaining his ends by treaties, leaving to the people their ancient belief, except in the case of those who wanted to become Muslims. All these events planted a deeply rooted hatred in their hearts.

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Muhammadan conquest of the country by Maḥmûd.

Now in the following times no Muslim conqueror passed beyond the frontier of Kâbul and the river Sindh until the days of the Turks, when they seized the power in Ghazna under the Sâmânî dynasty, and the supreme power fell to the lot of Nâṣir-addaula Sabuktagîn. This prince chose the holy war as his calling, and therefore called himself *Al-ghâzî* (i.e. *warring on the road of Allah*). In the interest of his successors he constructed, in order to weaken the Indian frontier, those roads on which afterwards his son Yamîn-addaula Maḥmûd marched into India during a period of thirty years and more. God be merciful to both father and son! Maḥmûd utterly ruined the prosperity of the country, and performed there wonderful exploits, by which the Hindus became like atoms of dust scattered in all directions, and like a tale of old in the mouth of the people. Their scattered remains cherish, of course, the most inveterate aversion towards all Muslims. This is the reason, too, why Hindu sciences have retired far away from those parts of the country conquered by us, and have fled to places which our hand cannot yet reach, to Kashmîr, Benares, and other places. And there the antagonism between them and all foreigners receives more and more nourishment both from political and religious sources.

Fifth reason: The self-conceit of the Hindus, and their depreciation of anything foreign.

In the fifth place, there are other causes, the mentioning of which sounds like a satire—peculiarities of their national character, deeply rooted in them, but manifest to everybody. We can only say, folly is an illness for which there is no medicine, and the Hindus believe that there is no country but theirs, no nation like theirs, no kings like theirs, no religion like theirs, no science like theirs. They are haughty, foolishly vain, self-conceited, and stolid. They are by nature niggardly in communicating that which they know, and they take the greatest possible care to withhold it from men of another caste among their own people, still much more, of course from any foreigner. According to their belief, there is no other country on earth but theirs, no other race of man but theirs, and no created beings besides them have any knowledge or science whatsoever. Their haughtiness is such that, if you tell them of any science or scholar in Khurâsân and Persis, they will think you to be both an ignoramus and a liar. If they travelled and mixed with other nations, they would soon change their mind, for their ancestors were not as narrow-minded as the present generation is. One of their scholars, Varâhamihira, in a passage where he calls on the people to honour the Brahmans, says: "*The Greeks, though impure, must be honoured, since they were trained in sciences, and therein excelled others. What, then, are we to say of a Brahman, if he combines with his* Page 12. *purity the height of science?*" In former times, the Hindus used to acknowledge that the progress of science due to the Greeks is much more important than that which is due to themselves. But from this passage of Varâhamihira alone you see what a self-lauding man he is, whilst he gives himself airs as doing justice to others. At first I stood to their astronomers in the relation of a pupil to his master, being a stranger among them and not acquainted with their peculiar national and traditional methods of science. On having made some progress, I began to show them the elements on which this science rests, to point out to them some rules of logical deduction and the scientific methods of all mathematics, and then they flocked together round me from all parts, wondering, and most eager to learn from me, asking me at the same time from what Hindu master I had learnt those things, whilst in reality I showed them what they were worth, and thought myself a great deal superior to them, disdaining to be put on a level with them. They almost thought me to be a sorcerer, and when speaking of me to their leading men in their native tongue, they spoke of me as *the sea* or as *the water which is so acid that vinegar in comparison is sweet.*

Personal relations of the author.

Now such is the state of things in India. I have found it very hard to work my way into the subject, although I have a great liking for it, in which respect I stand quite alone in my time, and although I do not spare either trouble or money in collecting Sanskrit books from places where I supposed they were likely to be found, and in procuring for myself, even from very remote places, Hindu scholars who understand them and are able to teach me. What scholar, however, has the same favourable opportunities of studying this subject as I have? That would be only the case with one to whom the grace of God accords, what it did not accord to me, a perfectly free disposal of his own doings and goings; for it has never fallen to my lot in my own doings and goings to be perfectly independent, nor to be invested with sufficient power to dispose and to order as I thought best. However, I thank God for that which he has bestowed upon me, and which must be considered as sufficient for the purpose.

The author declares his intention of comparing Greek theories, because of their being near akin, and of their strictly scientific character as contrasted with those of the Hindus.

The heathen Greeks, before the rise of Christianity, held much the same opinions as the Hindus; their educated classes thought much the same as those of the Hindus; their common people held the same idolatrous views as those of the Hindus. Therefore I like to confront the theories of the one nation with those of the other simply on account of their close relationship, not in order to correct them. For that which is not *the truth* (*i.e.* the true belief or monotheism) does not admit of any correction, and all heathenism, whether Greek or Indian, is in its pith and marrow one and the same belief, because it is only a deviation *from the truth*. The Greeks, however, had philosophers who, living in their country, discovered and worked out for them the elements of science, not of popular superstition, for it is the object of the upper classes to be guided by the results of science, whilst the common crowd will always be inclined to plunge into wrong-headed wrangling, as long as they are not kept down by fear of punishment. Think of Socrates when he opposed the crowd of his nation as to their idolatry and did not want to call the stars gods! At once eleven of the twelve judges of the Athenians agreed on a sentence of death, and Socrates died faithful to the truth.

The Hindus had no men of this stamp both capable and willing to bring sciences to a classical perfection. Therefore you mostly find that even the so-called scientific theorems of the Hindus are in a state of utter confusion, devoid of any logical order, and in the last instance always mixed up with the silly notions of the crowd, *e.g.* immense numbers, enormous spaces of time, and all kinds of religious dogmas, which the vulgar belief does not admit of being called into question. Therefore it is a prevailing practice among the Hindus *jurare in verba magistri;* and I can only compare their mathematical and astronomical literature, as far as I know it, to a mixture of pearl shells and sour dates, or of pearls and dung, or of costly crystals and common pebbles. Both kinds of things are equal in their eyes, since they cannot raise themselves to the methods of a strictly scientific deduction. Page 13.

The author's method.

In most parts of my work I simply relate without criticising, unless there be a special reason for doing so. I mention the necessary Sanskrit names and technical terms once where the context of our explanation demands it. If the word is an *original* one, the meaning of which can be rendered in Arabic, I only use the corresponding Arabic word; if, however, the Sanskrit word be more practical, we keep this, trying to transliterate it as accurately as possible. If the word is a secondary or *derived* one, but in general use, we also keep it, though there be a corresponding term in Arabic, but before using it we explain its signification. In this way we have tried to facilitate the understanding of the terminology.

Lastly, we observe that we cannot always in our discussions strictly adhere to the geometrical method, only referring to that which precedes and never to that which follows, as we must sometimes introduce in a chapter an unknown factor, the explanation of which can only be given in a later part of the book, God helping us!

CHAPTER II.

ON THE BELIEF OF THE HINDUS IN GOD.

The nature of God.

The belief of educated and uneducated people differs in every nation; for the former strive to conceive abstract ideas and to define general principles, whilst the latter do not pass beyond the apprehension of the senses, and are content with derived rules, without caring for details, especially in questions of religion and law, regarding which opinions and interests are divided.

The Hindus believe with regard to God that he is one, eternal, without beginning and end, acting by free-will, almighty, all-wise, living, giving life, ruling, preserving; one who in his sovereignty is unique, beyond all likeness and unlikeness, and that he does not resemble anything nor does anything resemble him. In order to illustrate this we shall produce some extracts from their literature, lest the reader should think that our account is nothing but hearsay.

Quotation from Patañjali.

In the book of Patañjali the pupil asks:

"Who is the worshipped one, by the worship of whom blessing is obtained?"

The master says:

"It is he who, being eternal and unique, does not for his part stand in need of any human action for which he might give as a recompense either a blissful repose, which is hoped and longed for, or a troubled existence, which is feared and dreaded. He is unattainable to thought, being sublime beyond all unlikeness which is abhorrent and all likeness which is sympathetic. He by his essence knows from all eternity. *Knowledge,* in the human sense of the term, has as its object that which was *unknown* before, whilst *not knowing* does not at any time or in any condition apply to God."

Further the pupil speaks:

"Do you attribute to him other qualities besides those you have mentioned?"

The master says:

"He is height, absolute in the idea, not in *space,* for he is sublime beyond all existence *in any space.* He is the pure absolute good, longed for by every created being. He is the knowledge free from the defilement of forgetfulness and not-knowing."

The pupil speaks:

"Do you attribute to him speech or not?"

The master says:

"As he knows, he no doubt also speaks."

The pupil asks:

"If he *speaks* because he *knows,* what, then, is the difference between him and the *knowing* sages who have *spoken* of their *knowing?*"

The master says:

Page 14. "The difference between them is time, for they have learned in time and spoken in time, after having been not-knowing and not-speaking. By speech they have transferred their knowledge to others. Therefore their speaking and acquiring knowledge take place in time. And as divine matters have no connection with time, God is *knowing, speaking* from eternity. It was he who spoke to Brahman, and to others of the first beings in different ways. On the one he bestowed a book; for the other he opened a door, a means of communicating with him; a third one he inspired so that he obtained by cogitation what God bestowed upon him."

The pupil asks:

"Whence has he this knowing?"

The master answers:

"His knowing is the same from all eternity, for ever and ever. As he has never been not-knowing, he is *knowing* of himself, having never acquired any knowledge which he did not possess before. He speaks in the Veda which he sent down upon Brahman:

"'*Praise and celebrate him who has spoken the Veda, and was before the Veda.*'"

The pupil asks:

"How do you worship him to whom the perception of the senses cannot attain?"

The master says:

"His name proves his existence, for where there is a report there must be something to which it refers, and where there is a name there must be something which is named. He is hidden to the senses and unperceivable by them. However, the soul perceives him, and thought comprehends his qualities. This meditation is identical with worshipping him exclusively, and by practising it uninterruptedly beatitude is obtained."

In this way the Hindus express themselves in this very famous book.

Quotation from the book *Gîtâ*.

The following passage is taken from the book *Gîtâ*, a part of the book *Bhârata*, from the conversation between Vâsudeva and Arjuna:—

"I am the universe, without a beginning by being born, or without an end by dying. I do not aim by whatever I do at any recompense. I do not specially belong to one class of beings to the exclusion of others, as if I were the friend of one and the enemy of others. I have given to each one in my creation what is sufficient for him in all his functions. Therefore whoever knows me in this capacity, and tries to become similar to me by keeping desire apart from his action, his fetters will be loosened, and he will easily be saved and freed."

This passage reminds one of the definition of philosophy as *the striving to become as much as possible similar to God.*

Further, Vâsudeva speaks in the same book:—

"It is desire which causes most men to take refuge with God for their wants. But if you examine their case closely, you will find that they are very far from having an accurate knowledge of him; for God is not apparent to every one, so that he might perceive him with his senses. Therefore they do not know him. Some of them do not pass beyond what their senses perceive; some pass beyond this, but stop at the knowledge of the *laws of nature,* without learning that above them there is one who did not give birth nor was born, the essence of whose being has not been comprehended by the knowledge of any one, while *his* knowledge comprehends everything."

On the notions of the action and the agent.

The Hindus differ among themselves as to the definition of what is *action.* Some who make God the source of action consider him as the universal cause; for as the existence of the *agents* derives from him, he is the cause of their action, and in consequence it is his own action coming into existence through their intermediation. Others do not derive action from God, but from other sources, considering them as the *particular causes* which in the last instance—according to external observation—produce the action in question.

Quotation from the book *Sâṁkhya.*

In the book *Sâṁkhya* the devotee speaks: "Has there been a difference of opinion about *action* and the *agent,* or not?"

The sage speaks: "Some people say that the soul is not alive and the matter not living; that God, who is self-sufficing, is he who unites them and separates them Page 15. from each other; that therefore in reality he himself is the *agent. Action* proceeds from him in such a way that he causes both the soul and the matter to move, like as that which is living and powerful moves that which is dead and weak.

"Others say that the union of *action* and the *agent* is effected by nature, and that such is the usual process in everything that increases and decreases.

"Others say the agent is the soul, because in the Véda it is said, 'Every being comes from Purusha.' According to others, the agent is time, for the world is tied to time as a sheep is tied to a strong cord, so that its motion depends upon whether the cord is drawn tight or slackened. Still others say that action is nothing but a recompense for something which has been done before.

"All these opinions are wrong. The truth is, that action entirely belongs to matter, for matter binds the soul, causes it to wander about in different shapes, and then sets it free. Therefore matter is the agent, all that belongs to matter helps it to accomplish action. But the soul is not an agent, because it is devoid of the different faculties."

Philosophical and vulgar notions about the nature of God.

This is what educated people believe about God. They call him *îśvara, i.e.* self-sufficing, beneficent, who gives without receiving. They consider the unity of God as absolute, but that everything beside God which may appear as a unity is really a plurality of things. The existence of God they consider as a real existence, because everything that exists exists through him. It is not impossible to think that the existing beings are *not* and that he *is*, but it is impossible to think that he *is not* and that they *are*.

If we now pass from the ideas of the educated people among the Hindus to those of the common people, we must first state that they present a great variety. Some of them are simply abominable, but similar errors also occur in other religions. Nay, even in Islam we must decidedly disapprove, *e.g.* of the anthropomorphic doctrines, the teachings of the Jabriyya sect, the prohibition of the discussion of religious topics, and such like. Every religious sentence destined for the people at large must be carefully worded, as the following example shows. Some Hindu scholar calls God *a point*, meaning to say thereby that the qualities of bodies do not apply to him. Now some uneducated man reads this and imagines, God is as small as *a point*, and he does not find out what the word *point* in this sentence was really intended to express. He will not even stop with this offensive comparison, but will describe God as much larger, and will say, "He is twelve fingers long and ten fingers broad." Praise be to God, who is far above measure and number! Further, if an uneducated man hears what we have mentioned, that God comprehends the universe so that nothing is concealed from him, he will at once imagine that this comprehending is effected by means of eyesight; that eyesight is only possible by means of an eye, and that two eyes are better than only one; and in consequence he will describe God as having a thousand eyes, meaning to describe his omniscience.

Similar hideous fictions are sometimes met with among the Hindus, especially among those castes who are not allowed to occupy themselves with science, of whom we shall speak hereafter.

CHAPTER III.

ON THE HINDU BELIEF AS TO CREATED THINGS, BOTH "INTELLIGIBILIA" AND "SENSIBILIA."

Notions of the Greeks and the Ṣûfî philosophers as to the *First Cause.*

On this subject the ancient Greeks held nearly the same views as the Hindus, at all events in those times before philosophy rose high among them under the care of the seven so-called *pillars of wisdom*, viz. Solon of Athens, Bias of Priene, Periander of Corinth, Thales of Miletus, Chilon of Lacedæmon, Pittacus of Lesbos, and Cleobulus of Lindos, and their successors. Some of them thought that all things are *one*, and this *one* thing is according to some *τὸ λανθάνειν*, according to others *ἡ δύναμις*; that *e.g.* man has only this prerogative before a stone and the inanimate world, that he is by one degree nearer than they to the *First Cause.* But this he would not be anything better than they.

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Others think that only *the First Cause* has real existence, because it alone is self-sufficing, whilst everything else absolutely requires it; that a thing which for its existence stands in need of something else has only a dream-life, no real life, and that reality is only that *one* and *first* being (*the First Cause*).

Origin of the word Ṣûfî.

This is also the theory of the *Ṣûfîs*, i.e. *the sages*, for *ṣûf* means in Greek *wisdom* (*σοφία*). Therefore a philosopher is called *pailâsôpâ* (*φιλόσοφος*), *i.e.* loving wisdom. When in Islam persons adopted something like the doctrines of these *philosophers*, they also adopted their name; but some people did not understand the meaning of the word, and erroneously combined it with the Arabic word *ṣuffa*, as if the *Ṣûfî* (=φιλόσοφοι) were identical with the so-called *'Ahl-aṣṣuffa* among the companions of Muḥammad. In later times the word was corrupted by misspelling, so that finally it was taken for a derivation from *ṣûf*, i.e. *the wool of goats.* Abû-alfatḥ Albustî made a laudable effort to avoid this mistake when he said, "From olden times people have differed as to the meaning of the word *ṣûfî*, and have thought it a derivative from *ṣûf*, *i.e.* wool. I, for my part, understand by the word a youth who is *ṣâfî*, *i.e.* pure. This *ṣâfî* has become *ṣûfî*, and in this form the name of a class of thinkers, the *Ṣûfî*."

Further, the same Greeks think that the existing world is only *one* thing; that the First Cause appears in it under various shapes; that the power of the First Cause is inherent in the parts of the world under different circumstances, which cause a certain difference of the things of the world notwithstanding their original unity.

Others thought that he who turns with his whole being towards the First Cause, striving to become as much as possible similar to *it*, will become united with *it* after having passed the intermediate stages, and stripped of all appendages and impediments. Similar views are also held by the *Ṣûfî*, because of the similarity of the dogma.

As to the souls and spirits, the Greeks think that they exist by themselves before they enter bodies; that they exist in certain numbers and groups, which stand in various relations to each other, knowing each other and not knowing; that they, whilst staying in bodies, earn by the actions of their free-will that lot which awaits them after their separation from the bodies, *i.e.* the faculty of ruling the world in various ways. Therefore they called them gods, built temples in their names and offered them sacrifices; as Galenus says in his book called προτρεπτικὸς εἰς τὰς τέχνας: "Excel-

Galenus.

lent men have obtained the honour of being reckoned among the deified beings only for the noble spirit in which they cultivated the arts, not for their prowess in wrestling and discus-throwing. *E.g.* Asclepius and Dionysos, whether they were originally human beings in bygone times and afterwards deified, or were divine beings from the very beginning, deserved in any case the greatest of honours, because the one taught mankind the science of medicine, the other the art of the cultivation of the vine."

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Galenus says in his commentary on the aphorisms of Hippocrates: "As regards the offerings to Asclepius, we have never heard that anybody offered him a goat, because the weaving of goat's-hair is not easy, and much goat's-meat produces epilepsy, since the humours of the goats are bad. People only offer him a cock, as also Hippocrates has done. For this divine man acquired for mankind the art of medicine, which is much superior to that which Dionysos and Demeter have invented, *i.e.* the wine and the cereals whence bread is prepared. Therefore cereals are called by the name of Demeter and the vine is called by the name of Dionysos."

Plato.

Plato says in his *Timæus:* "The *θεοί* whom the barbarians call *gods*, because of their not dying, are the *δαίμονες*, whilst they call *the* god *the first god.*"

Further he says: "God spoke to the gods, 'You are not of yourselves exempt from destruction. Only you will not perish by death. You have obtained from my will at the time when I created you, the firmest covenant.'"

In another passage of the same book he says: "God is in the single number; there are no gods in the plural number."

These quotations prove that the Greeks call in general *god* everything that is glorious and noble, and the like usage exists among many nations. They go

island Langabâlûs there is a large star visible, known as the *fever-star*. It appears in winter about morning dawn in the east as high as a date-palm tree, having an oblong shape, composed of the tail of the Small Bear and his back, and of some small stars situated there; it is called *the axe of the mill*. Brahmagupta mentions it in connection with *the Fish*. The Hindus tell rather ludicrous tales when speaking of the figure in which they represent this group of stars, viz. the figure of a four-footed aquatic animal, which they call *Śakvara* and also *Śiśumâra*. I suppose that the latter animal is the great lizard, for in Persia it is called *Susmâr*, which sounds much like the Indian *Śiśumâra*. Of this kind of animals there is also an aquatic species, similar to the crocodile and the skink. One of those tales is the following.

The story of Dhruva.

When Brahman wanted to create mankind, he divided himself into two halves, of which the right one was called *Virâj*, the left one *Manu*. The latter one is the being from whom the period of time called *Manvantara* has received its name. Manu had two sons, Priyavrata and Uttânapâda, the bow-legged king. The latter had a son called *Dhruva*, who was slighted by one of the wives of his father. On account of this, he was presented with the power to turn round all the stars as he pleased. He appeared in the Manvantara of Svayambhuva, the first of all Manvantaras, and he has for ever remained in his place.

Quotations from *Vâyu-Purâṇa* and *Vishṇu-Dharma*.

The *Vâyu-Purâṇa* says: "The wind drives the stars round the pole, which are bound to it by ties invisible to man. They move round like the beam in the olive-press, for its bottom is, as it were, standing still, whilst its end is moving round.

The *Vishṇu-Dharma* says: "Vajra, one of the children of Balabhadra, the brother of Nârâyaṇa, asked the Ṛishi Mârkaṇḍeya as to the pole, upon which he answered: When God created the world, it was dark and desert.

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Thereupon he made the globe of the sun shining, and the globes of the stars watery, receiving the light of the sun from that side of his which he turns towards them. Fourteen of these stars he placed round the pole in the shape of a *śiśumâra*, which drive the other stars round the pole. One of them, north of the pole, on the uppermost chin, is Uttânapâda, on the lowest chin Yajna, on the head Dharma, on the breast Nârâyaṇa, on the two hands towards the east the two stars Aśvinî the physicians, on the two feet Varuṇa, and Aryaman towards the west, on the penis Samwatsara, on the back Mitra, on the tail Agni, Mahendra, Marîci, and Kaśyapa."

The pole itself is Vishṇu, the ruler of the inhabitants of paradise; he is, further, the time rising, growing, getting old, and vanishing.

Further, the *Vishṇu-Dharma* says: "If a man reads this and knows it accurately, God pardons to him the sins of that day, and fourteen years will be added to his life, the length of which has been fixed beforehand."

How simple those people are! Among us there are scholars who know between 1020 to 1030 stars. Should those men breathe and receive life from God only on account of their knowledge of stars?

All the stars revolve, whatever may be the position of the pole with regard to them.

If I had found a Hindu able to point out to me with his finger the single stars, I should have been able to identify them with the star-figures known among Greeks and Arabs, or with stars in the neighbourhood in case they did not belong to any of these figures.

CHAPTER XXIII.

ON MOUNT MERU ACCORDING TO THE BELIEF OF THE AUTHORS OF THE PURÂṆAS AND OF OTHERS.

Brahmagupta on the earth and Mount Meru.

WE begin with the description of this mountain, since it is the centre of the Dvîpas and seas, and, at the same time, the centre of Jambûdvîpa. Brahmagupta says: "Manifold are the opinions of people relating to the description of the earth and to Mount Meru, particularly among those who study the Purâṇas and the religious literature. Some describe this mountain as rising above the surface of the earth to an excessive height. It is situated under the pole, and the stars revolve round its foot, so that rising and setting depends upon Meru. It is called Meru because of its having the faculty of doing this, and because it depends alone upon the influence of its head that sun and moon become visible. The day of the angels who inhabit Meru lasts six months, and their night also six months."

Brahmagupta quotes the following passage from the book of *Jina, i.e.* Buddha: "Mount Meru is quadrangular, not round."

Balabhadra on the same subject.

The commentator Balabhadra says: "Some people say that the earth is flat, and that Mount Meru is an illuminating, light-giving body. However, if such were the case, the planets would not revolve round the horizon of the inhabitants of Meru; and if it were shining it would be visible because of its height, as the pole above it is visible. According to some, Meru consists of gold; according to others it consists of jewels. Âryabhaṭa thinks that it has not absolute height, but only the height of *one yojana*, and that it is round, not quadrangular, the realm of the angels; that it is invisible, although shining, because it is very distant from the inhabited earth, being situated entirely in the high north, in the cold zone, in the centre of a desert called *Nandana-vana*. However, if it were of a great height, it would not be possible on the 66th degree of latitude for the whole Tropic of Cancer to be visible, and for the sun to revolve on it, being always visible without ever disappearing."

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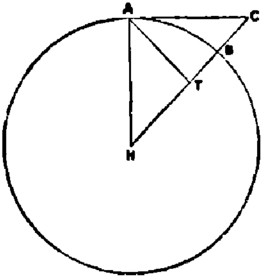
The author criticises Balabhadra.

All that Balabhadra produces is foolish both in words and matter, and I cannot find why he felt himself called upon to write a commentary if he had nothing better to say.

If he tries to refute the theory of the flatness of the earth by the planets revolving round the horizon of Meru, this argument would go nearer proving the theory than refuting it. For if the earth were a flat expanse, and everything high on earth were parallel to the perpendicular height of Meru, there would be no change of horizon, and the same horizon would be the equinox for all places on earth.



The statements of Âryabhaṭa examined by the author.

On the words of Âryabhaṭa as quoted by Balabhadra we make the following remarks.

Let A B be the globe of the earth round the centre H. Further, A is a place on the earth in the 66th degree of latitude. We cut off from the circle the arc A B, equal to the greatest declination. Then B is the place in the zenith of which the pole stands.

Further, we draw the line A C touching the globe in the point A. This line lies in the plane of the horizon as far as the human eye reaches round the earth.

We join the points A and H with each other, and draw the line H B C, so that it is met in C by the line A C. Further, we let fall the perpendicular A T on H C. Now, it is evident that—

A T is the sine of the greatest declination;
T B the versed sine of the greatest declination;
T H the sine of the complement of the greatest declination.

And as we here occupy ourselves with Âryabhaṭa, we shall, according to his system, change the sines in *kardajât*. Accordingly—

A T = 1397.
T H = 3140.
B T = 298.

Because the angle H A C is a right angle, we have the equation—

$$HT : TA = TA : TC.$$

And the square of A T is 1,951,609. If we divide it by T H, we get as quotient 622.

The difference between this number and T B is 324, which is B C. And the relation of B C to B H, the latter being *sinus totus* = 3438, is the same as the relation of the number of *yojanas* of B C to the *yojanas* of B H. The latter number is, according to Âryabhaṭa, 800. If it is multiplied by the just-mentioned difference of 324 we get the sum of 259,200. And if we divide this number by the *sinus totus* we get 75 as quotient, which is the number of *yojanas* of B C, equal to 600 *miles* or 200 *farsakh*.

If the perpendicular of a mountain is 200 *farsakh*, the ascent will be nearly the double. Whether Mount Meru has such a height or not, nothing of it can be visible in the 66th degree of latitude, and it would not cover anything of the Tropic of Cancer at all (so as to intercept from it the light of the sun). And if for those latitudes (66° and 23°) Meru is under the horizon, it is also under the horizon for all places of less latitude. If you compare Meru with a luminous body like the sun, you know that the sun sets and disappears under the earth. Indeed Meru may be compared with the earth. Page 123. It is not invisible to us because of its being far away in the cold zone, but because it lies below the horizon, because the earth is a globe, and everything heavy is attracted towards its centre.

Âryabhaṭa further tries to prove that Mount Meru has only a moderate height by the fact that the Tropic of Cancer is visible in places the latitude of which is equal to the complement of the greatest declination. We must remark that this argument is not valid, for we know the conditions of the lines of latitude and other lines in those countries only through ratiocination, not from eyesight nor from tradition, because they are uninhabited and their roads are impassable.

If a man has come from those parts to Âryabhaṭa and told him that the Tropic of Cancer is visible in that latitude, we may meet this by stating that a man has also come to *us* from the same region telling us that one part of it is there invisible. The only thing which covers the Tropic of Cancer is this mountain Meru. If Meru did not exist, the whole tropic would be visible. Who, now, has been able to make out which of the two reports deserves most credit?

In the book of Âryabhaṭa of Kusumapura we read that the mountain Meru is in Himavant, the cold zone, not higher than a *yojana*. In the translation, however, it has been rendered so as to express that it is not higher than Himavant by more than a *yojana*.

This author is not identical with the elder Âryabhaṭa, but he belongs to his followers, for he quotes him and follows his example. I do not know which of these two namesakes is meant by Balabhadra.

In general, what we know of the conditions of the place of this mountain we know only by ratiocination. About the mountain itself they have many traditions. Some give it the height of one *yojana*, others more; some consider it as quadrangular, others as an octagon. We shall now lay before the reader what the Ṛishis teach regarding this mountain.

Matsya-Purâṇa on Mount Meru and the mountains of the earth.

The *Matsya-Purâṇa* says: "It is golden and shining like fire which is not dulled by smoke. It has four different colours on its four sides. The colour of the eastern side is white like the colour of the Brahmins, that of the northern is red like that of the Kshatriya, that of the southern is yellow like the colour of the Vaiśya, and that of the western is black like the colour of the Śûdra. It is 86,000 *yojana* high, and 16,000 of these *yojana* lie within the earth. Each of its four sides has 34,000 *yojana*. There are rivers of sweet water running in it, and beautiful golden houses inhabited by the spiritual beings, the Deva, by their singers the Gandharva, and their harlots the Apsaras. Also Asuras, Daityas, and Râkshasas are living in it. Round the mountain lies the pond Mânasa, and around it to all four sides are the *Lokapâla*, *i.e.* the guardians of the world and its inhabitants. Mount Meru has seven *knots*, *i.e.* great mountains, the names of which are Mahendra, Malaya, Sahya, Śuktibâm (?), Ṛikshabâm (?), Vindhya, Pâriyâtra. The small mountains are nearly innumerable; they are those which are inhabited by mankind.

"The great mountains round Meru are the following: *Himavant*, always covered with snow, inhabited by the Râkshasa, Piśâca, and Yaksha. *Hemakûṭa*, the golden, inhabited by the Gandharva and Apsaras. *Nishadha*, inhabited by the Nâga or snakes, which have the following seven princes: Ananta, Vâsuki, Takshaka, Karkoṭaka, Mahâpadma, Kambala, Aśvatara. *Nîla*, peacock-like, of many colours, inhabited by the Siddha and Brahmarshi, the anchorites. The mountain Page 124.

Śveta, inhabited by the Daitya and Dânava. The mountain *Śriṅgavant*, inhabited by the Pitaras, the fathers and grandfathers of the Deva. Not far to the north of this mountain there are mountain-passes full of jewels and of trees which remain during a whole kalpa. And in the centre of these mountains is Ilâvṛita, the highest of all. The whole is called *Purushaparvata*. The region between the Himavant and the Śriṅgavant is called Kailâsa, the play-ground of the Râkshasa and Apsaras."

Quotations from the *Vishṇu*, *Vâyu*, and *Âditya Purâṇas*.

The *Vishṇu-Purâṇa* says: "The great mountains of the middle earth are Śrî-parvata, Malaya-parvata, Mâlyavant, Vindhya, Trikûṭa, Tripurântika, and Kailâsa. Their inhabitants drink the water of the rivers, and live in eternal bliss."

The *Vâyu-Purâṇa* contains similar statements about the four sides and the height of Meru as the hitherto quoted Purâṇas. Besides, it says that on each side of it there is a quadrangular mountain, in the east the Mâlyavant, in the north Ânîla, in the west the Gandhamâdana, and in the south the Nishadha.

The *Âditya-Purâṇa* gives the same statement about the size of each of its four sides which we have quoted from the *Matsya-Purâṇa*, but I have not found in it a statement about the height of Meru. According to this Purâṇa, its east side is of gold, the west of silver, the south of rubies, the north of different jewels.

The commentator of Patañjali on the same subject.

The extravagant notions of the dimensions of Meru would be impossible if they had not the same extravagant notions regarding the earth, and if there is no limit fixed to guesswork, guesswork may without any hindrance develop into lying. For instance, the commentator of the book of Patañjali not only makes Meru quadrangular, but even oblong. The length of one side he fixes at 15 *koṭi*, *i.e.* 150,000,000 *yojana*, whilst he fixes the length of the other three sides only at the third of this, *i.e.* 5 *koṭi*. Regarding the four sides of

Meru, he says that on the east are the mountain Mâlava and the ocean, and between them the kingdoms called Bhadrâśva. On the north are Nîla, Sîta, Śriṅgâdri, and the ocean, and between them the kingdoms Ramyaka, Hiraṇmaya, and Kuru. On the west are the mountain Gandhamâdana and the ocean, and between them the kingdom Ketumâla. On the south are Mrâvarta (?), Nishadha, Hemakûṭa, Himagiri, and the ocean, and between them the kingdoms Bhâratavârsha, Kiṁpurusha, and Harivarsha.

Buddhistic views.

This is all I could find of Hindu traditions regarding Meru; and as I have never found a Buddhistic book, and never knew a Buddhist from whom I might have learned their theories on this subject, all I relate of them I can only relate on the authority of Alêrânshahrî, though, according to my mind, his report has no claim to scientific exactness, nor is it the report of a man who has a scientific knowledge of the subject. According to him, the Buddhists believe that Meru lies between four worlds in the four cardinal directions; that it is square at the bottom and round at the top; that it has the length of 80,000 *yojana*, one half of which rises into heaven, whilst the other half goes down into the earth. That side which is next to our world consists of blue sapphires, which is the reason why heaven appears to us blue; the other sides are of rubies, yellow and white gems. Thus Meru is the centre of the earth.

The mountain *Ḳâf*, as it is called by our common people, is with the Hindus the Lokâloka. They maintain that the sun revolves from Lokâloka towards Meru, and that he illuminates only its inner northern side.

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A tradition of the Zoroastrians of Sogdiana.

Similar views are held by the Zoroastrians of Sogdiana, viz. that the mountain Ardiyâ surrounds the world; that outside of it is *khôm*, similar to the pupil of the eye, in which there is something of everything, and that behind it there is a *vacuum*. In the centre of the world is the mountain *Girnagar*, between our *κλίμα* and the six other *κλίματα*, the throne of heaven. Between each two there is burning sand, on which no foot could stand. The spheres revolve in the *climata* like *mills*, but in ours they revolve in an inclined course, because our *clima*, that one inhabited by mankind, is the uppermost.

CHAPTER XXIV.

TRADITIONS OF THE PURÂṆAS REGARDING EACH OF THE SEVEN DVÎPAS.

Description of the Dvîpas according to the *Matsya* and *Vishṇu Purâṇas.*

We must ask the reader not to take any offence if he finds all the words and meanings which occur in the present chapter to be totally different from anything corresponding in Arabic. As for the difference of words, it is easily accounted for by the difference of languages in general; and as regards the difference of the meanings, we mention them only either in order to draw attention to an idea which might seem acceptable even to a Muslim, or to point out the irrational nature of a thing which has no foundation in itself.

1. Jambû-Dvîpa.

We have already spoken of the central Dvîpa when describing the environs of the mountain in its centre. It is called Jambû-Dvîpa, from a tree growing in it, the branches of which extend over a space of 100 *yojana*. In a later chapter, devoted to the description of the inhabitable world and its division, we shall finish the description of Jambû-Dvîpa. Next, however, we shall describe the other Dvîpas which surround it, following, as regards the order of the names, the authority of *Matsya-Purâṇa*, for the above-mentioned reason (v. p. 236). But before entering into this subject we shall here insert a tradition of the *Vâyu-Purâṇa* regarding the central Dvîpa (Jambû-Dvîpa).

The inhabitants of Madhyadeśa, according to *Vâyu-Purâṇa*.

According to this source, "there are two kinds of inhabitants in Madhyadeśa. First the *Kimpurusha*. Their men are known as the gold-coloured ones, their women as *sureṇu*. They live a long life without ever being ill. They never commit a sin, and do not know envy. Their food is a juice which they express from the dates of the palm trees, called *madya* (?). The second kind are the *Haripurusha,* having the colour of silver. They live 11,000 years, are beardless, and their food is sugar-cane." Since they are described as beardless and silver-coloured, one might be inclined to take them for Turks; but the fact of their eating dates and sugar-cane compels us to see in them a more southern nation. But where do we find people of the colour of gold or silver? We know only of the colour of burnt silver, which occurs, *e.g.* among the Zanj, who lead a life without sorrow and envy, as they do not possess anything which gives birth to these passions. They live no doubt longer than we, but only a little longer, and by no means twice as long. The Zanj are so uncivilised that they have no notion of a natural death. If a man dies a natural death, they think he was poisoned. Every death is suspicious with them, if a man has not been killed by a weapon. Likewise it is regarded with suspicion by them, if a man is touched by the breath of a consumptive person.

2. Śâka-Dvîpa.

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We shall now describe *Śâka-Dvîpa.* It has, according to the *Matsya-Purâṇa,* seven great rivers, one of which equals the Ganges in purity. In the first ocean there are seven mountains adorned with jewels, some of which are inhabited by Devas, others by demons. One of them is a golden, lofty mountain, whence the clouds rise which bring us the rain. Another contains all the medicines. Indra, the ruler, takes from it the rain. Another one is called Soma. Regarding this mountain they relate the following story:—

The story of Kadrû and Vinatâ. Garuda liberates his mother by means of the Amṛita.

Kaśyapa had two wives, Kadrû, the mother of the snakes, and Vinatâ, the mother of the birds. Both lived in a plain where there was a grey horse. However, the mother of the snakes maintained that the horse was brown. Now they made the covenant that she who was wrong should become the slave of the other, but they postponed the decision till the following day. In the following night the mother of the snakes sent her black children to the horse, to wind themselves round it and to conceal its colour. In consequence the mother of the birds became her slave for a time.

The latter, Vinatâ, had two children, Anûru, the guardian of the tower of the sun, which is drawn by the horses, and Garuḍa. The latter spoke to his mother: "Demand from the children nourished at your breast what may restore you to liberty." This she did. People also spoke to her of the ambrosia (amṛita), which is with the Devas. Thereupon Garuḍa flew to the Devas and demanded it from them, and they fulfilled his wish. For Amṛita is one of those things peculiar to them, and if somebody else gets it, he lives as long as the Devas. He humbled himself before them in order to obtain the Amṛita, for the purpose of freeing therewith his mother, at the same time promising to bring it back afterwards. They had pity upon him, and gave it him. Thereupon Garuḍa went to the mountain Soma, in which the Devas were living. Garuḍa gave the Amṛita to the Devas, and thereby freed his mother. Then he spoke to them: "Do not come near the Amṛita unless you have before bathed in the river Ganges." This they did, and left the Amṛita where it was. Meanwhile Garuḍa brought it back to the Devas, and obtained thereby a high rank in sanctity, so that he became the king of all the birds and the riding-bird of Vishṇu.

The inhabitants of Śâka-Dvîpa are pious, long-lived beings, who can dispense with the rule of kings, since they do not know envy nor ambition. Their lifetime, not capable of any change, is as long as a Tretayuga. The four colours are among them, *i.e.* the different castes, which do not intermarry nor mix with each other.

They live in eternal joy, without ever being sorry. According to *Vishṇu-Purâṇa*, the names of their castes are Âryaka, Kurura, Viviṁśa (Vivaṁśa), and Bhâvin (?), and they worship Vâsudeva.

3. Kuśa-Dvîpa.

The third Dvîpa is Kuśa-Dvîpa. According to the *Matsya-Purâṇa* it has seven mountains containing jewels, fruit, flowers, odoriferous plants, and cereals. One of them, named Droṇa, contains famous medicines or drugs, particularly the *viśalyakaraṇa*, which heals every wound instantaneously, and *mṛitasaṁjîvan*, which restores the dead to life. Another one, called *hari*, is similar to a black cloud. On this mountain there is a fire called *Mahisha*, which has come out of the water, and will remain there till the destruction of the world; it is this very fire which will burn the world. Kuśa-Dvîpa has seven kingdoms and innumerable rivers flowing to the sea, which are then changed by Indra into rain. To the greatest rivers belongs *Jaunu* (Yamunâ), which purifies from all sins. About the inhabitants of this Dvîpa, *Matsya-Purâṇa* does not give any information. According to *Vishṇu-Purâṇa* the inhabitants are pious, sinless people, every one of them living 10,000 years. They worship *Janârdana*, and the names of their castes are Damin, Śushmin, Sneha, and Mandeha.

4. Krauñca-Dvîpa.

The fourth, or Krauñca-Dvîpa, has, according to the *Matsya-Purâṇa*, mountains containing jewels, rivers which are branches of the Ganges, and kingdoms the people of which have a white colour and are pious and Page 127. pure. According to *Vishṇu-Purâṇa* the people there live in one and the same place without any distinction among members of the community, but afterwards it says that the names of their castes are Pushkara, Pushkala, Dhanya, and Tishya (?). They worship Janârdana.

5. Śâlmala-Dvîpa.

The fifth, or Śâlmala-Dvîpa, has, according to the *Matsya-Purâṇa*, mountains and rivers. Its inhabitants are pure, long-lived, mild, and never angry. They never suffer from drought or dearth, for their food comes to them simply in answer to their wishes, without their sowing or toiling. They come into existence without being born; they are never ill nor sorry. They do not require the rule of kings, since they do not know the desire for property. They live contented and in safety; they always prefer that which is good and love virtue. The climate of this Dvîpa never alters in cold or heat, so they are not bound to protect themselves against either. They have no rain, but the water bubbles up for them out of the earth and drops down from the mountains. This is also the case in the following Dvîpas. The inhabitants are of one kind, without any distinction of caste. Every one lives 3000 years.

According to the *Vishṇu-Purâṇa* they have beautiful faces and worship *Bhagavat.* They bring offerings to the fire, and every one of them lives 10,000 years. The names of their castes are Kapila, Aruṇa, Pîta, and Kṛishṇa.

6. Gomeda-Dvîpa.

The sixth, or Gomeda-Dvîpa, has, according to the *Matsya-Purâṇa,* two great mountains, the deep-black *Sumanas,* which encompasses the greatest part of the Dvîpa, and the *Kumuda,* of golden colour and very lofty; the latter one contains all medicines. This Dvîpa has two kingdoms.

According to *Vishṇu-Purâṇa* the inhabitants are pious and without sin and worship Vishṇu. The names of their castes are Mṛiga, Mâgadha, Mânasa, and Mandaga. The climate of this Dvîpa is so healthy and pleasant that the inhabitants of paradise now and then visit it on account of the fragrancy of its air.

7. Pushkara-Dvîpa.

The seventh, or Pushkara-Dvîpa, has, according to the *Matsya-Purâṇa,* in its eastern part the mountain *Citraśâlâ, i.e.* having a variegated roof with horns of jewels. Its height is 34,000 *yojana,* and its circumference 25,000 *yojana.* In the west lies the mountain Mânasa, shining like the full moon; its height is 35,000 *yojana.* This mountain has a son who protects his father against the west. In the east of this Dvîpa are two kingdoms where every inhabitant lives 10,000 years. The water bubbles up for them out of the earth, and drops down from the mountains. They have no rain and no flowing river; they know neither summer nor winter. They are of one kind, without any distinction of caste. They never suffer from dearth, and do not get old. Everything they wish for comes to them, whilst they live quiet and happy without knowing anything else but virtue. It is as if they were in the suburb of paradise. All bliss is given to them; they live long and are without ambition. So there is no service, no rule, no sin, no envy, no opposition, no debating, no toiling in agriculture and diligence in trading.

According to the *Vishṇu-Purâṇa,* Pushkara-Dvîpa is so called from a large tree, which is also called *nyagrodha.* Under this tree is *Brahma-rûpa, i.e.* the figure of Brahman, worshipped by the Deva and Dânava. The inhabitants are equal among each other, not claiming any superiority, whether they be human beings or beings associating with the Devas. In this Dvîpa there is only a single mountain, called *Mânasottama,* which rises in a round form on the round Dvîpa. From its top all the other Dvîpas are visible, for its height is 50,000 *yojana,* and the breadth the same.

CHAPTER XXV.

ON THE RIVERS OF INDIA, THEIR SOURCES AND COURSES.

Page 128. Quotation from *Vâyu-Purâna*

The *Vâyu-Purâṇa* enumerates the rivers rising in the well-known great mountains which we have mentioned as the knots of Mount Meru (*vide* p. 247). To facilitate the study we exhibit them in the following table :—

The Great Knots.	Names of the Rivers which rise in them in Nagarasamvṛitta.
Mahendra, .	Triśâgâ, Ṛishikulyâ, Ikshulâ, Tripavâ (?), Âyanâ (?), Lâṅgûlinî, Vaṁśavara.
Malaya, . .	Kṛitamâlâ, Tâmravarṇâ, Pushpajâtî, Utpalavatî (!).
Sahya, . .	Godâvarî, Bhîmarathî, Kṛishṇa, Vaiṇyâ, Savañjulâ, Tuṅgabhadrâ, Suprayogâ, Pâjaya (?), Kâverî.
Śukti, . .	Ṛishîka, Bâlûka (!), Kumârî, Mandavâhinî, Kirpa (!), Palâśinî.
Ṛiksha, . .	Śona, Mahânada, Narmadâ, Surasa, Kirva (?), Mandâkinî, Daśârṇâ, Citrakûṭâ, Tamasâ, Pipyala, Śroṇî, Karamoda (?), Piśâbika (?), Çitrapala, Mahâvegâ, Bañjulâ, Bâluvâhiṇî, Śuktimatî, Shukruṇâ (?), Tridivâ.
Vindhya, .	Tâpî, Payoshṇî, Nirbindhyâ, Sirvâ (?), Nishadhâ, Vênvâ, Vaitaraṇî, Sini, Hâhu (!) Kumudvatî, Tobâ, Mahâgaurî, Durgâ, Antaśilâ.
Pâriyâtra, .	Vedasmṛiti, Vedavatî, Vṛitraghnî (?) Parṇâśâ, Nandanâ, Saddânâ (?), Râmadî (?), Pârâ, Carmaṇvatî, Lûpa (?), Vidiśâ.

The rivers of Europe and Asia rising in the Himalaya and its extensions to west and east.

The *Matsya-Purâṇa* and *Vâyu-Purâṇa* mention the rivers flowing in Jambû-Dvîpa, and say that they rise in the mountains of Himavant. In the following table we simply enumerate them, without following any particular principle of arrangement. The reader must imagine that the mountains form the boundaries of India. The northern mountains are the snowy Himavant. In their centre lies Kashmîr, and they are connected with the country of the Turks. This mountain region becomes colder and colder till the end of the inhabitable world and Mount Meru. Because this mountain has its chief extension in longitude, the rivers rising on its north side flow through the countries of the Turks, Tibetans, Khazars, and Slavonians, and fall into the Sea of Jurjân (the Caspian Sea), or the Sea of Khwârizm (the Aral Sea), or the Sea Pontus (the Black Sea), or the northern Sea of the Slavonians (the Baltic); whilst the rivers rising on the southern slopes flow through India and fall into the great ocean, some reaching it single, others combined.

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Rivers of India.

The rivers of India come either from the cold mountains in the north or from the eastern mountains, both of which in reality form one and the same chain, extending towards the east, and then turning towards the south until they reach the great ocean, where parts of it penetrate into the sea at the place called the *Dike of Râma*. Of course, these mountains differ very much in cold and heat.

We exhibit the names of the rivers in the following table:—

Sindh or the river of Vaihand.	Biyatta or Jailam.	Candrabhâgâ or Candrâha.	Biyâha to the west of Lahore.	Irâvati to the east of Lahore.	S'atarudra or Shataldar.
Sarsat, flowing through the country Sarsat.	Jaun.	Gañgâ.	Sarayû or Sarwa.	Devikâ.	Kuhû.
Gomati.	Dhutapâpâ.	Viśâlâ.	Bâhudâsa (!).	Kauśiki.	Niścirâ.
Gaṇḍaki.	Lohitâ.	Drishadvati.	Tâmrâ Aruṇâ.	Parnâśâ.	Vedasmṛiti.
Vidâsini.	Candanâ.	Kâwanâ.	Parâ.	Carmaṇvati.	Vidiśâ.
Veṇumati.	S'iprâ, rises in the Pâriyâtrâ and passes Ujain.	Karatoyâ.	Shmâhina.		

Sindh river. Page 130.

In the mountains bordering on the kingdom of Kâyabish, *i.e.* Kâbul, rises a river which is called *Ghorwand*, on account of its many branches. It is joined by several affluents :—

1. The river of the pass of Ghûzak.

2. The river of the gorge of Panchîr, below the town of Parwân.

3, 4. The river Sharvat and the river Sâwa, which latter flows through the town of Lanbagâ, *i.e.* Lamghân ; they join the Ghorvand at the fortress of Drûta.

5, 6. The rivers Nûr and Ḳirâ.

Swelled by these affluents, the Ghorvand is a great river opposite the town of Purshâvar, being there called *the ford*, from a ford near the village of Mahanâra, on the eastern banks of the river, and it falls into the river Sindh near the castle of Bîtûr, below the capital of Alḳandahâr (Gandhâra), *i.e.* Vaihand.

The river Biyatta, known as Jailam, from the city of

Rivers of the Panjâb.

this name on its western banks, and the river Candarâha join each other nearly fifty miles above Jahrâvar, and pass along west of Multân.

The river Biyâh flows east of Multân, and joins afterwards the Biyatta and Candarâha.

The river Irâva is joined by the river Kaj, which rises in Nagarkot in the mountains of Bhâtul. Thereupon follows as the fifth the river Shatladar (Satlej).

After these five rivers have united below Multân at a place called *Pañcanada, i.e.* the meeting-place of the five rivers, they form an enormous watercourse. In flood-times it sometimes swells to such a degree as to cover nearly a space of ten *farsakh*, and to rise above the trees of the plains, so that afterwards the rubbish carried by the floods is found in their highest branches like birds-nests.

The Muslims call the river, after it has passed the Sindhî city Aror, as a united stream, *the river of Mihrân*. Thus it extends, flowing straight on, becoming broader and broader, and gaining in purity of water, enclosing in its course places like islands, until it reaches Almanṣûra, situated between several of its arms, and flows into the ocean at two places, near the city Loharânî, and more eastward in the province of Kacch at a place called *Sindhu-sâgara*, i.e. *the Sindh Sea.*

Eranian tradition.

As the name *union of the five rivers* occurs in this part of the world (in Panjâb), we observe that a similar name is used also to the north of the above-mentioned mountain chains, for the rivers which flow thence towards the north, after having united near Tirmidh and having formed the river of Balkh, are called *the union of the seven rivers.* The Zoroastrians of Sogdiana have confounded these two things; for they say that the whole of the seven rivers is *Sindh*, and its upper course *Barîdîsh.* A man descending on it sees the sinking of the sun on his right side if he turns his face towards the west, as we see it here on our left side (*sic*).

Various rivers of India.

The river Sarsati falls into the sea at the distance of a bowshot east of Somanâth.

The river Jaun joins the Ganges below Kanoj, which lies west of it. The united stream falls into the great ocean near Gaṅgâsâgara.

Between the mouths of the rivers Sarsati and Ganges is the mouth of the river Narmadâ, which descends from the eastern mountains, takes its course in a south-western direction, and falls into the sea near the town Bahroj, nearly sixty *yojana* east of Somanâth.

Behind the Ganges flow the rivers Rahab and Kawînî, which join the river Sarwa near the city of Bârî.

The Hindus believe that the Ganges in ancient times flowed in Paradise, and we shall relate at a subsequent opportunity how it happened to come down upon earth.

Quotation from *Matsya-Purâṇa*. Page 131.

The *Matsya-Purâṇa* says: "After the Ganges had settled on earth, it divided itself into seven arms, the middle of which is the main stream, known as the Ganges. Three flowed eastward, Nalinî, Hrâdinî, and Pâvanî, and three westward, Sîtâ, Cakshu, and Sindhu.

The river Sîta rises in the Himavant, and flows through these countries: Salila, Karstuba, Cîna, Varvara, Yavasa (?), Baha, Pushkara, Kulata, Maṅgala, Kavara, and Saṅgavanta (?); then it falls into the western ocean.

South of Sîta flows the river Cakshuś, which irrigates the countries Cîna, Maru, Kâlika (?), Dhûlika (?), Tukhâra, Barbara, Kâca (?), Palhava, and Bârwancat.

The river Sindh flows through the countries Sindhu, Darada, Zindutunda (?), Gândhâra, Rûrasa (?), Krûra (?), Śivapaura, Indramaru, Sabâtî (?), Saindhava, Kubata, Bahimarvara, Mara, Mrûna, and Sukûrda.

The river Ganges, which is the middle and main stream, flows through the Gandharva, the musicians, Kiṁnara, Yakshas, Râkshasa, Vidyâdhara, Uraga, *i.e.* those who creep on their breasts, the serpents, Kalâpagrama, *i.e.* the city of the most virtuous, Kiṁpurusha, Khasa (?), the mountaineers, Kirâta, Pulinda, the hunters in the plains, robbers, Kuru, Bharata, Pañcâla, Kaushaka (?), Mâtsya, Magadha, Brahmottara, and Tâmalipta. These are the good and bad beings through whose territories the Ganges flows. Afterwards it enters into branches of the mountain Vindhya, where the elephants live, and then it falls into the southern ocean.

Of the eastern Ganges arms, the Hrâdinî flows through the countries Nishaba, Ûpakâna, Dhîvara, Prishaka, Nîlamukha, Kîkara, Ushṭrakarṇa, *i.e.* people whose lips are turned like their ears, Kirâta, Kalîdara, Vivarṇa, *i.e.* the colourless people, so called on account of their intense blackness, Kushikâna, and Svargabhûmi, *i.e.* a country like Paradise. Finally it falls into the eastern ocean.

The river Pâvanî gives water to the Kupatha (?), who are far from sin, Indradyumnasaras, *i.e.* the cisterns of the king Indradyumna, Kharapatha, Bîtra, and Sañkupatha. It flows through the steppe Udyânamarûra, through the country of the Kuśaprâvaraṇa, and Indradvîpa, and afterwards it falls into the salt sea.

The river Nalinî flows through Tâmara, Haṁsamârga, Samûhuka, and Pûrṇa. All these are pious people who abstain from evil. Then it flows through the midst of mountains and passes by the Karṇaprâvaraṇa, *i.e.* people whose ears fall down on their shoulders, Aśvamukha, *i.e.* people with horse-faces, Parvatamaru, mountainous steppes, and Rûmîmaṇḍala. Finally it flows into the ocean.

Vishṇu-Purâṇa.

The *Vishṇu-Purâṇa* mentions that the great rivers of the middle earth which flow into the ocean are Anutapata, Shikhi, Dipâpa, Tridivâ, Karma, Amṛita and Sukṛita.

CHAPTER XXVI.

ON THE SHAPE OF HEAVEN AND EARTH ACCORDING TO THE HINDU ASTRONOMERS.

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THIS and similar questions have received at the hands of the Hindus a treatment and solution totally different from that which they have received among us Muslims. The sentences of the Koran on these and other subjects necessary for man to know are not such as to require a strained interpretation in order to become positive certainties in the minds of the hearers, and the same may be said regarding the holy codes revealed before the Koran. The sentences of the Koran on all subjects necessary for man to know are in perfect harmony with the other religious codes, and at the same time they are perfectly clear, without any ambiguity. Besides, the Koran does not contain questions which have for ever been subjects of controversy, nor such questions the solution of which has always been despaired of, *e.g.* questions similar to certain puzzles of chronology.

The Koran, a certain and clear basis of all research.

Islam was already in its earliest times exposed to the machinations of people who were opposed to it in the bottom of their heart, people who preached Islam with sectarian tendencies, and who read to simple-minded audiences out of their Koran-copies passages of which not a single word was ever *created* (*i.e.* revealed) by God. But people believed them and copied these things on their authority, beguiled by their hypocrisy; nay, they disregarded the true form of the book which they had had until then, because the vulgar mind is

Islam falsified: I. By a Judaistic party.

always inclined to any kind of delusion. Thus the pure tradition of Islam has been rendered confused by this Judaistic party.

II. By the dualists.

Islam encountered a second mishap at the hands of the Zindîḳs, the followers of Mânî, like Ibn Almuḳaffa', 'Abd-alkarîm Ibn 'Abî-al'aujâ', and others, who, being the fathers of criticism, and declaring one thing as *just*, another as *admissible*, &c., raised doubts in weak-minded people as to the One and First, *i.e.* the Unique and Eternal God, and directed their sympathies towards dualism. At the same time they presented the biography of Mânî to the people in such a beautiful garb that they were gained over to his side. Now this man did not confine himself to the trash of his sectarian theology, but also proclaimed his views about the form of the world, as may be seen from his books, which were intended for deliberate deception. His opinions were far-spread. Together with the inventions of the above-mentioned Judaistic party, they formed a religious system which was declared to be *the Islam*, but with which God has nothing whatever to do. Whoso opposes it and firmly adheres to the orthodox faith in conformity with the Koran is stigmatised by them as an infidel and heretic and condemned to death, and they will not allow him to hear the word of the Koran. All these acts of theirs are more impious than even the words of Pharaoh, "I am your highest lord" (Sura, 79, 24), and "I do not know of any god for you save myself" (Sura, 28, 38). If party spirit of this kind will go on and rule for a long time, we may easily decline from the straight path of honour and duty. We, however, take our refuge with God, who renders firm the foot of every one who seeks *Him*, and who seeks the truth about Him.

Veneration of the Hindus for their astronomers.

The religious books of the Hindus and their codes of tradition, the Purâṇas, contain sentences about the shape of the world which stand in direct opposition to scientific truth as known to their astronomers. By these books people are guided in fulfilling the rites of their religion, and by means of them the great mass of the nation have been wheedled into a predilection for astronomical calculation and astrological predictions and warnings. The consequence is, that they show much affection to their astronomers, declaring that they are excellent men, that it is a good omen to meet them, and firmly believing that all of them come into Paradise and none into hell. For this the astronomers requite them by accepting their popular notions as truth, by conforming themselves to them, however far from truth most of them may be, and by presenting them with such spiritual stuff as they stand in need of. This is the reason why the two theories, the vulgar and the scientific, have become intermingled in the course of time, why the doctrines of the astronomers have been disturbed and confused, in particular the doctrines of those authors—and they are the majority—who simply copy their predecessors, who take the bases of their science from tradition and do not make them the objects of independent scientific research.

Astronomers admit popular notions into their doctrines.

General observations on the rotundity of the earth, on Meru and Vaḍavâmukha.

We shall now explain the views of Hindu astronomers regarding the present subject, viz. the shape of heaven and earth. According to them, heaven as well as the whole world is round, and the earth has a globular shape, the northern half being dry land, the southern half being covered with water. The dimension of the earth is larger according to them than it is according to the Greeks and modern observations, and in their calculations to find this dimension they have entirely given up any mention of the traditional seas and *Dvîpas*, and of the enormous sums of *yojana* attributed to each of them. The astronomers follow the theologians in everything which does not encroach upon their science, *e.g.* they adopt the theory of Mount Meru being under the north pole, and that of the island

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Vaḍavâmukha lying under the south pole. Now, it is entirely irrelevant whether Meru is there or not, as it is only required for the explanation of the particular mill-like rotation, which is necessitated by the fact that to each spot on the plane of the earth corresponds a spot in the sky as its zenith. Also the fable of the southern island Vaḍavâmukha does no harm to their science, although it is possible, nay, even likely, that each pair of quarters of the earth forms a coherent, uninterrupted unity, the one as a continent, the other as an ocean (and that in reality there is no such island under the south pole). Such a disposition of the earth is required by the law of gravitation, for according to them the earth is in the centre of the universe, and everything heavy gravitates towards it. Evidently on account of this law of gravitation they consider heaven, too, as having a globular shape.

We shall now exhibit the opinions of the Hindu astronomers on this subject according to our translation of their works. In case, however, one word or other in our translation should be used in a meaning different from that which it generally has in our sciences, we ask the reader to consider only the original meaning of the word (not the technical one), for this only is meant.

Quotation from the *Siddhânta* of Pulisa.

Pulisa says in his *Siddhânta:* "Paulisa the Greek says somewhere that the earth has *a globular shape,* whilst in another place he says that it has *the shape of a cover* (*i.e.* of a flat plane). And in both sentences he is right; for the plane or surface of the earth is *round,* and its diameter is a straight line. That he, however, only believed in the globular shape of the earth, may be proved by many passages of his work. Besides, all scholars agree on this head, as Varâhamihira, Âryabhaṭa, Deva, Śrîsheṇa, Vishṇucandra, and Brahman. If the earth were not round, it would not be girded with the latitudes of the different places on earth, day and night would not be different in winter and summer, and the conditions of the planets and of their rotations would be quite different from what they are.

"The position of the earth is central. Half of it is clay, half water. Mount Meru is in the dry half, the home of the Deva, the angels, and above it is the pole. In the other half, which is covered by water, lies Vaḍavâmukha, under the south pole, a continent like an island, inhabited by the Daitya and Nâga, relatives of the Deva on Meru. Therefore it is also called Daityântara.

"The line which divides the two earth-halves, the dry and the wet, from each other, is called *Niraksha, i.e. having no latitude*, being identical with our equator. In the four cardinal directions with relation to this line there are four great cities:—

Yamakoṭi, in the east.
Laṅkâ, in the south.
Romaka, in the west.
Siddhapura, in the north.

"The earth is fastened on the two poles, and held by the axis. When the sun rises over the line which passes both through Meru and Laṅkâ, that moment is noon to Yamakoṭi, midnight to the Greeks, and evening to Siddhapura."

In the same manner things are represented by Âryabhaṭa.

Quotation from the *Brahmasiddhânta* of Brahmagupta.

Brahmagupta, the son of Jishṇu, a native of Bhillamâla, says in his *Brahmasiddhânta*: "Many are the sayings of people about the shape of the earth, specially among those who study the Purâṇas and the religious books. Some say that it is level like a mirror, others say that it is hollow like a bowl. Others maintain that it is level like a mirror, inclosed by a sea, this sea being inclosed by an earth, this earth being inclosed by a sea, &c., all of them being round like collars. Each sea or earth has the double size of that which it incloses. The outside earth is sixty-four times as large as the central earth, and the sea inclosing the outside earth is

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sixty-four times as large as the sea inclosing the central earth. Several circumstances, however, compel us to attribute globular shape both to the earth and heaven, viz. the fact that the stars rise and set in different places at different times, so that, *e.g.* a man in Yamakoṭi observes one identical star rising above the western horizon, whilst a man in Rûm at the same time observes it rising above the eastern horizon. Another argument to the same effect is this, that a man on Meru observes one identical star above the horizon in the zenith of Lankâ, the country of the demons, whilst a man in Lankâ at the same time observes it above his head. Besides, all astronomical calculations are not correct unless we assume the globular figure of heaven and earth. Therefore we must declare that heaven is a globe, because we observe in it all the characteristics of a globe, and the observation of these characteristics of the world would not be correct unless in reality it were a globe. Now, it is evident that all the other theories about the world are futile."

Quotations from various astronomers.

Âryabhaṭa inquires into the nature of the world, and says that it consists of earth, water, fire, and wind, and that each of these elements is round.

Likewise Vasishṭha and Lâṭa say that the five elements, viz. earth, water, fire, wind, and heaven, are round.

Varâhamihira says that all things which are perceived by the senses, are witnesses in favour of the globular shape of the earth, and refute the possibility of its having another shape.

Âryabhaṭa, Pulisa, Vasishṭha, and Lâṭa agree in this, that when it is noon in Yamakoṭi, it is midnight in Rûm, beginning of the day in Lankâ, and beginning of the night in Siddhapura, which is not possible if the world is not round. Likewise the periodicity of the eclipses can only be explained by the world's being round.

Lâṭa says: "On each place of the earth only one-half of the globe of heaven is seen. The more northern our latitude is, the more Meru and the pole rise above the horizon; as they sink down below the horizon, the more southern is our latitude. The equator sinks down from the zenith of places, the greater their latitude is both in north and south. A man who is north of the equator only sees the north pole, whilst the south pole is invisible to him, and *vice versâ*."

Considerations regarding the rotundity of the earth, the balance of gravity between the northern and southern halves, and the attraction of gravitation.

These are the words of Hindu astronomers regarding the globular shape of heaven and earth, and what is between them, and regarding the fact that the earth, situated in the centre of the globe, is only of a small size in comparison with the visible part of heaven. These thoughts are the elements of astronomy as contained in the first chapter of Ptolemy's *Almagest*, and of similar books, though they are not worked out in that scientific form in which we are accustomed to give them,

(*Lacuna*,)

for the earth is more heavy than the water, and the water is fluid like the air. The globular form must be to the earth a physical necessity, as long as it does not, by the order of God, take another form. Therefore the earth could not move towards the north, nor the water Page 135. move towards the south, and in consequence one whole half is not *terra firma*, nor the other half water, unless we suppose that the *terra firma* half be hollow. As far as our observation, based on induction, goes, the *terra firma* must be in one of the two northern quarters, and therefore we guess that the same is the case on the adjacent quarter. We admit the possibility of the existence of the island Vaḍavâmukha, but we do not maintain it, since all we know of it and of Meru is exclusively based on tradition.

The equatorial line does not, in the quarter of the earth known to us, represent a boundary between *terra* *firma* and the ocean. For in certain places the continent protrudes far into the ocean, so as to pass beyond the equator, *e.g.* the plains of the negroes in the west, which protrude far towards the south, even beyond the *mountains of the moon* and the sources of the Nile, in fact, into regions which we do not exactly know. For that continent is desert and impassable, and likewise the sea behind Sufâla of the Zanj is unnavigable. No ship which ventured to go there has ever returned to relate what it had witnessed.

Also a great part of India above the province of Sindh deeply protrudes far towards the south, and seems even to pass beyond the equator.

In the midst between both lie Arabia and Yemen, but they do not go so far south as to cross the equator.

Further, as the *terra firma* stretches far out into the ocean, thus the ocean too penetrates into *terra firma*, breaking into it in various places, and forming bays and gulfs. For instance, the sea extends as a tongue along the west side of Arabia as far as the neighbourhood of Central Syria. It is narrowest near Ḳulzum, whence it is also called *the Sea of Ḳulzum.*

Another and still larger arm of the sea exists east of Arabia, the so-called *Persian Sea.* Between India and China, also, the sea forms a great curve towards the north.

Hence it is evident that the coast-line of these countries does not correspond to the equator, nor keep an invariable distance from it,

(*Lacuna,*)

and the explanation relating to the four cities will follow in its proper place.

The difference of the times which has been remarked is one of the results of the rotundity of the earth, and of its occupying the centre of the globe. And if they attribute to the earth, though it be round, inhabitants—for cities cannot be imagined without inhabitants—the existence of men on earth is accounted for by the attraction of everything heavy towards its centre, *i.e.* the middle of the world.

Quotations from the *Vâyu* and *Matsya Purâṇas.*

Much to the same effect are the expressions of *Vâyu-Purâṇa*, viz. that noon in Amarâvatî is sunrise in Vaivasvata, midnight in Sukhâ, and sunset in Vibhâ.

Similar, also, are the expressions of *Matsya-Purâṇa*, for this book explains that east of Meru lies the city Amarâvatîpura, the residence of Indra, the ruler, and his wife; south of Meru, the city Saṁyamanîpura, the residence of Yama, the son of the Sun, where he punishes and requites mankind; west of Meru, the city Sukhâpura, the residence of Varuṇa, *i.e.* the water; and north of Meru, the city Vibhâvarîpura, belonging to the Moon. Sun and planets revolve round Meru. When the sun has his noon position in Amarâvatîpura, it is the beginning of the day in Saṁyamanîpura, midnight in Sukhâ, and the beginning of the night in Vibhâvarîpura. And when the sun has his noon position in Saṁyamanîpura, he rises over Sukhâpura, sets over Amaravatîpura, and has his midnight position with relation to Vibhavarîpura. Page 136.

A note of the author on the passage from the *Matsya-Purâṇa*.

If the author of the *Matsya-Purâṇa* says that the sun revolves round Meru, he means a mill-like rotation round those who inhabit Meru, who, in consequence of this nature of the rotation, do not know east nor west. The sun does not rise for the inhabitants of Meru in one particular place, but in various places. By the word *east* the author means the zenith of one city, and by *west* the zenith of another. Possibly those four cities of the *Matsya-Purâṇa* are identical with those mentioned by the astronomers. But the author has not mentioned how far they are distant from Meru. What we have besides related as notions of the Hindus is perfectly correct and borne out by scientific methods; however, they are wont never to speak of the pole unless they mention in the same breath also the mountain Meru.

Brahmagupta and Varâhamihira on the law of gravitation.

In the definition of what is *low* the Hindus agree with us, viz. that it is *the centre of the world*, but their expressions on this head are subtle, more particularly as this is one of the great questions which is only handled by the most eminent of their scholars.

So Brahmagupta says: "Scholars have declared that the globe of the earth is in the midst of heaven, and that Mount Meru, the home of the Devas, as well as Vaḍavâmukha below, is the home of their opponents; the Daitya and Dânava belong to it. But this *below* is according to them only a relative one. Disregarding this, we say that the earth on all its sides is the same; all people on earth stand upright, and all heavy things fall down to the earth by a law of nature, for it is the nature of the earth to attract and to keep things, as it is the nature of water to flow, that of fire to burn, and that of the wind to set in motion. If a thing wants to go deeper down than the earth, let it try. The earth is the only *low* thing, and seeds always return to it, in whatever direction you may throw them away, and never rise upwards from the earth."

Varâhamihira says: "Mountains, seas, rivers, trees, cities, men, and angels, all are around the globe of the earth. And if Yamakoṭi and Rûm are opposite to each other, one could not say that the one is *low* in its relation to the other, since the *low* does not exist. How could one say of one place of the earth that it is *low*, as it is in every particular identical with any other place on earth, and one place could as little *fall* as any other. Every one speaks to himself with regard to his own self, '*I* am *above* and the others are *below*,' whilst all of them are around the globe like the blossoms springing on the branches of a Kadamba-tree. They encircle it on all sides, but each individual blossom has the same position as the other, neither the one hanging downward nor the other standing upright. For the earth attracts that which is upon her, for it is the *below* towards all directions, and heaven is the *above* towards all directions."

As the reader will observe, these theories of the

Hindus are based on the correct knowledge of the laws of nature, but, at the same time, they practise a little deceit upon their traditionalists and theologians. So Balabhadra the commentator says: "It is the most correct of the opinions of people, many and different as they are, that the earth and Meru and the zodiacal sphere are round. And the Âpta (?)-purâṇa-kâra, *i.e.* the faithful followers of the Purâṇa, say: 'The earth is like the back of a tortoise; it is not round from below.' They are perfectly right, because the earth is in the midst of the water, and that which appears above the water has the shape of a tortoise-back; and the sea around the earth is not navigable. The fact of the earth being round is proved by eyesight."

Quotations from Balabhadra, and the author's criticisms on them.

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Here the reader must notice how Balabhadra declares the theory of the theologians as to the rotundity of the back to be true. He gives himself the air of not knowing that they deny that the womb, *i.e.* the other half of the globe, is round, and he busies himself with a traditional element (as to the earth being like the back of a tortoise), which, in reality, has no connection with the subject.

Further, Balabhadra says: "Human eyesight reaches to a point distant from the earth and its rotundity the 96th part of 5000 *yojana*, *i.e.* 52 *yojana* (exactly $52\frac{1}{12}$). Therefore man does not observe its rotundity, and hence the discrepancy of opinions on the subject."

Those pious men (the Âpta (?)-purâṇa-kâra) do not deny the rotundity of the back of the earth; nay, they maintain it by comparing the earth to the back of a tortoise. Only Balabhadra makes them deny it (by the words, "the earth is not round from below," *supra*), since he understood their words as meaning that the water surrounds the earth. That which rises above the water may either be globular or a plain rising above the water like an inverted drum, *i.e.* like a segment of a round pilaster.

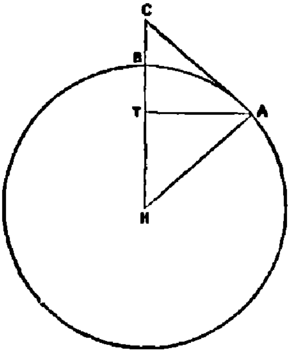
Further, the remark of Balabhadra (v. p. 273), that man, on account of the smallness of his stature, cannot observe the rotundity of the earth, is not true; because even if the human stature were as tall as the plumb-line of the highest mountain, if he were to make his observation only from one single point without going to other places, and without reasoning about the observations made at the different places, even such a height would be of no avail to him, and he would not be able to perceive the rotundity of the earth and its nature.

What, however, is the connection of this remark with the popular theory? If he had concluded from analogy that that side of the earth which is opposed to the *round* one—I mean the lower half—was also round, and if he then had given his theory about the extent of the power of human vision as a result of reflection, not as a result of the perception of the senses, his theory would seem to have a certain foundation.

Calculation on the extent of human vision on the earth.

With regard to Balabhadra's definition of the extent which may be reached by the human eye, we propose the following calculation:—

Let A B round the centre H represent the globe of the earth. B is the standing-point of the observer; his stature is B C. Further, we draw the line C A, so that it touches the earth.



Now it is evident that the field of vision is B A, which we suppose to be equal to $\frac{1}{96}$ of the circle, *i.e.* $3\frac{3}{4}$ degrees, if we divide the circle into 360 degrees.

According to the method followed in the calculation of the mountain Meru (in chap. xxiii.), we divide the square of T A, *i.e.* 50,625, by

H T, *i.e.* 3431′. So we get as quotient T C = 0° 14′ 45″; and B C, the stature of the observer, is 0° 7′ 45″.

Our calculation is based on this, that H B, the *sinus totus*, is 3438′. However, the radius of the earth is, according to the circumference which we have mentioned, 795° 27′ 16″ (*yojana*). If we measure B C by this measure, it is = 1 *yojana*, 6 *krośa*, 1035 yards (=57,035 yards). If we suppose B C to be equal to four yards, it stands in the same relation to A T, according to the measure of the sine, as 57,035, *i.e.* the yards which we have found as the measure of the stature, to A T according to the measure of the sine, *i.e.* 225. If we now calculate the sine, we find it to be 0° 0′ 1″ 3‴, and its arc has the same measure. However, each degree of the rotundity of the earth represents the measure of 13 *yojana*, 7 *krośa*, and 333⅓ yards (*sic*). Therefore the field of vision on the earth is 291⅔ yards (*sic*). Page 138.

(*For an explanation of this calculation see the notes.*)

The source of this calculation of Balabhadra's is the *Pulisa-siddhânta*, which divides the arc of the quarter of a circle into 24 *kardajât*. He says: "If anybody asks for the reason of this, he must know that each of these *kardajât* is $\frac{1}{96}$ of the circle = 225 minutes (= 3¾ degrees). And if we reckon its sine, we find it also to be = 225 minutes." This shows us that the sines are equal to their arcs in parts which are smaller than this *kardaja*. And because the *sinus totus*, according to Pulisa and Âryabhaṭa, has the relation of the diameter to the circle of 360 degrees, this arithmetical equality brought Balabhadra to think that the arc was perpendicular; and any expanse in which no convexity protrudes preventing the vision from passing, and which is not too small to be seen, is visible.

This, however, is a gross mistake; for the arc is never perpendicular, and the sine, however small it be, never equals the arc. This is admissible only for such degrees as are supposed for the convenience of calculation, but it is never and nowhere true for the degrees of the earth.

The axis of the earth according to Pulisa.

If Pulisa says (v. p. 267) that the earth is held by an axis, he does not mean thereby that in reality there exists such an axis, and that but for it the earth would fall. How could he say such a thing, since he is of opinion that there are four inhabited cities around the world, which is explained by the fact that everything heavy falls from all sides down towards the earth? However, Pulisa holds this view, that the motion of the peripheric parts is the reason why the central parts are motionless, and that the motion of a globe presupposes two poles, and one line connecting them, which in the idea is the axis. It is as if he meant to say, that the motion of heaven keeps the earth in its place, making it the natural place for the earth, outside of which it could never be. And this place lies on the midst of the axis of motion. For the other diameters of the globe may also be imagined to be axes, since ἐν δυνάμει they are all axes, and if the earth were not in the midst of an axis, there might be axes which did not pass through the earth. Hence one may say metaphorically that the earth is supported by the axes.

Whether the earth moves or is at rest, according to Brahmagupta and the author.

As regards the resting of the earth, one of the elementary problems of astronomy, which offers many and great difficulties, this, too, is a dogma with the Hindu astronomers. Brahmagupta says in the *Brahmasiddhânta:* "Some people maintain that the *first* motion

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(from east to west) does not lie in the meridian, but belongs to the earth. But Varâhamihira refutes them by saying: 'If that were the case, a bird would not return to its nest as soon as it had flown away from it towards the west.' And, in fact, it is precisely as Varâhamihira says."

Brahmagupta says in another place of the same book: "The followers of Âryabhaṭa maintain that the earth is moving and heaven resting. People have tried to refute them by saying that, if such were the case, stones and trees would fall from the earth."

But Brahmagupta does not agree with them, and says that that would not necessarily follow from their theory, apparently because he thought that all heavy things are attracted towards the centre of the earth. He says: "On the contrary, if that were the case, *the earth would not vie in keeping an even and uniform pace with the minutes of heaven, the prâṇas of the times.*"

There seems to be some confusion in this chapter, perhaps by the fault of the translator. For the *minutes of heaven* are 21,600, and are called *prâṇa, i.e.* breaths, because according to them each minute of the meridian revolves in *the time of an ordinary human breath.*

Supposing this to be true, and that the earth makes a complete rotation eastward in so many breaths as heaven does according to his (Brahmagupta's) view, we cannot see what should prevent the earth from keeping an even and uniform pace with heaven.

Besides, the rotation of the earth does in no way impair the value of astronomy, as all appearances of an astronomic character can quite as well be explained according to this theory as to the other. There are, however, other reasons which make it impossible. This question is most difficult to solve. The most prominent of both modern and ancient astronomers have deeply studied the question of the moving of the earth, and tried to refute it. We, too, have composed a book on the subject called *Miftâḥ-'ilm-alhai'a* (*Key of Astronomy*), in which we think we have surpassed our predecessors, if not in the words, at all events in the matter.

CHAPTER XXVII.

ON THE FIRST TWO MOTIONS OF THE UNIVERSE (THAT FROM EAST TO WEST ACCORDING TO ANCIENT ASTRONOMERS AND THE PRECESSION OF THE EQUINOXES), BOTH ACCORDING TO HINDU ASTRONOMERS AND THE AUTHORS OF THE PURÂṆAS.

THE astronomers of the Hindus hold on this subject mostly the same views as ourselves. We shall give quotations from them, but shall at once confess that that which we are able to give is very scanty indeed.

Quotation on the subject from Pulisa.

Pulisa says: "The wind makes the sphere of the fixed stars revolve; the two poles keep it in its place, and its motion appears to the inhabitants of Mount Meru as a motion from the left to the right; to the inhabitants of Vaḍavâmukha as one from the right to the left."

In another place he says: "If anybody asks for the direction of the motion of the stars which we see rising in the east and rotating towards the west until they set, let him know that the motion which *we* see as a westward motion appears different according to the places which the spectators occupy. The inhabitants of Mount Meru see it as a motion from the left to the right, whilst the inhabitants of Vaḍavâmukha see it as the opposite, as a motion from the right to the left. The inhabitants of the equator see it exclusively as a westward motion, and the inhabitants of the parts of the earth between the poles and the equator see it more or less depressed, as their places have more or less northern or southern latitude. The whole of this motion is caused by the wind, which makes the spheres revolve, and compels the planets and the other stars to rise in the east and to set in the west. This, however, is only an *accidens*. As for the *essentia rei*, the motions of the heavenly bodies are directed towards the east, from *Alsharaṭân* towards *Albuṭain*, the latter lying east of the former. But if the inquirer does not know the lunar stations, and is not capable of procuring for himself by their help an idea of this eastward motion, let him observe the moon herself, how she moves away from the sun once and a second time; how she then comes near him, till she finally joins him. This will give him an idea of the *second* motion."

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Quotations from Brahmagupta and Balabhadra.

Brahmagupta says: "The sphere has been created as moving with the greatest rapidity possible about two poles without ever slackening, and the stars have been created where there is no *Baṭn-ḥût* nor *Sharaṭân*, *i.e.* on the frontier between them, which is the vernal equinox."

Balabhadra, the commentator, says: "The whole world hangs on two poles, and moves in a circular motion, which begins with a *kalpa* and ends with a *kalpa*. But people must not therefore say that the world, on account of the continuity of its motion, is without beginning and without end."

Brahmagupta says: "The place without latitude (*Niraksha*), divided into sixty *ghaṭikâ*, is the horizon for the inhabitants of Meru. There east is west; and behind that place (beyond the equator) towards the south is Vaḍavâmukha and the ocean which surrounds it. When the spheres and the stars revolve, the meridian becomes an horizon common to the Devas (in the north) and the Daityas (in the south), which they see together. But the direction of the motion appears to them as different. The motion which the angels see as a motion to the right, the Daityas see as one to the left, and *vice versâ*, just as a man who has a thing on his right side, looking into the water, sees it on his left. The cause of this uniform motion which never increases nor decreases is a wind, but it is not the common wind which we feel and hear; for this is lulled, and roused, and varies, whilst *that* wind never slackens."

In another place Brahmagupta says: "The wind makes all the fixed stars and the planets revolve towards the west in one and the same revolution; but the planets move also in a slow pace towards the east, like a dust-atom moving on a potter's-wheel in a direction opposite to that in which the wheel is revolving. That motion of this atom which is visible is identical with the motion which drives the wheel round, whilst its individual motion is not perceived. In this view Lâṭa, Âryabhaṭa, and Vasishṭha agree, but some people think that the earth moves while the sun is resting. That motion which mankind conceives as a motion from east to west, the angels (Deva) conceive as a motion from left to right, the Daityas as one from right to left."

Criticisms of the author. The wind as the motor of the sphere.

This is all I have read in Indian books on the subject.

Their speaking of the wind as the *motor* (*supra*) has, I think, only the purpose of bringing the subject near to the understanding of people and to facilitate its study; for people see with their own eyes that the wind, when blowing against instruments with wings and toys of this kind, puts them into motion. But as soon as they come to speak of the *first mover* (God), they at once give up any comparison with the natural wind, which in all its phases is determined by certain causes. For though it puts things into motion, the *moving* is not its essence; and besides, it cannot move without being in contact with something, because the wind is a body, and is acted upon by external influences or means, its motion being commensurate with their force.

Their saying that the wind does not rest, simply means that the moving power works perpetually, and does not imply rest and motion such as are proper to bodies. Further, their saying that it does *not slacken* means that it is free from all kinds of accidents; for *slackening* and *weakening* only occur in such bodies or beings which are composed of elements of conflicting qualities.

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On the two poles *keeping* the sphere.

The expression that the two poles *keep* the sphere of the fixed stars (p. 278) means that they keep or preserve it in its normal state of motion, not that they keep or preserve it from falling down. There is a story of an ancient Greek who thought that once upon a time the Milky Way had been a road of the sun, and that afterwards he had left it. Such a thing would mean that the motions ceased to be normal, and to something like this the expression of *the poles keeping the sphere of the fixed stars* may be referred.

On the relative nature of time.

The phrase of Balabhadra about *the ending of the motion* (that it ends with a *kalpa*, &c., p. 279) means that everything which exists and may be determined arithmetically has no doubt an end, for two reasons: *first*, because it has a beginning, for every number consists of *one* and its reduplications, whilst the *one* itself exists before all of them; and, *secondly*, because part of it exists in the present moment of time, for if days and nights increase in number through the continuation of existence, they must necessarily have a beginning whence they started. If a man maintains that *time* does not exist in the sphere (as one of its immanent qualities), and thinks that day and night have only a *relative* existence, exist only *in relation* to the earth and its inhabitants, that if, *e.g.*, the earth were taken away out of the midst of the world, also night and day would cease to exist as well as the possibility of measuring elements composed of days, he would thereby impose upon Balabhadra the necessity of a digression, and compel him to prove the cause, not of the *first*, but of the *second* motion. The latter cause is the cycles of the planets, which have only a relation to *the sphere*, not to *the earth*. These cycles Balabhadara indicates by the word *kalpa* (v. p. 279), since it comprehends them all, and since all of them begin with its beginning.

The meridian divided into sixty *ghaṭiká*.

If Brahmagupta says of the meridian that it is divided into sixty parts (v. p. 279), it is as if any one of us should say, the meridian is divided into twenty-four parts; for the meridian is a medium for measuring and counting time. Its revolution lasts twenty-four hours, or, as the Hindus will have it, sixty *ghaṭiká* (or *gharí*). This is the reason why they have reckoned the risings of the zodiacal signs in *ghaṭiká*, not in *times of the meridian* (360 degrees).

On the fixed stars.

If, further, Brahmagupta says that the wind causes the fixed stars and the planets to revolve, if he besides, in particular, attributes a slow eastward motion to the planets (p. 280), he gives the reader to understand that the fixed stars have no such motion, or else he would have said that they, too, have the same slow eastward motion as the planets, not differing from them save in size and in the variation which they exhibit in the retrograde motion. Some people relate that the ancients originally did not understand their (the fixed stars') motions until, in long periods of time, they became aware of them. This opinion is confirmed by the fact that Brahmagupta's book does not, among the various cycles, mention the cycles of the fixed stars, and that he makes their appearing and disappearing depend upon invariable degrees of the sun.

The direction of the heavenly motion, as seen from different points of the earth.

If Brahmagupta maintains (p. 278) that to the inhabitants of the equator the *first motion* is not a motion to the right and left, the reader must bear in mind the following. A man dwelling under either of the two poles, to whatever direction he turns, has always the moving heavenly bodies *before* himself, and as they move in one direction, they must necessarily first stand opposite one of his hands, and then, moving on, come to stand opposite his other hand. The direction of this motion appears to the inhabitants of the two poles just the very contrary, like the image of a thing in the water or a mirror, where its directions seem to be exchanged. If the image of a man is reflected by the water or a mirror, he appears as a different man standing opposite to the spectator, his right side opposite to Page 142 the left of the spectator, and his left side opposite to the right of the spectator.

Likewise the inhabitants of places of northern latitude have the revolving heavenly bodies *before* themselves towards the south, and the inhabitants of places of southern latitude have them *before* themselves towards the north. To them the motion appears the same as to the inhabitants of Meru and Vaḍavâmukha. But as regards those living on the equator, the heavenly bodies revolve nearly *above their heads*, so they cannot have them *before* themselves in any direction. In reality, however, they deviate a little from the equator, and in consequence the people there have a uniform motion before themselves on two sides the motion of the northern heavenly bodies from right to left, and that of the southern bodies from left to right. So they unite in their persons the faculty of the inhabitants of the two poles (viz. of seeing the heavenly bodies moving in different directions), and it depends entirely upon their will, if they want to see the stars move from the right to the left or *vice versâ*.

It is the line passing through the zenith of a man standing on the equator which Brahmagupta means when he says that it is divided into sixty parts (v. p. 279).

The authors of the Purâṇas represent heaven as a dome or cupola standing on earth and resting, and the stars as beings which wander individually from east to west. How could these men have any idea of the *second* motion? And if they really had such an idea, how could an opponent of the same class of men concede the possibility that one and the same thing individually moves in two different directions?

We shall here communicate what we know of their theories, although we are aware that the reader will not derive any profit from them, since they are simply useless.

Quotation from the *Matsya-Purâṇa.*

The *Matsya-Purâṇa* says: "The sun and the stars pass along southward as rapidly as an arrow revolving round Meru. The sun revolves round something like a beam, the end of which is burning when its revolution is very rapid. The sun does not really disappear (during the night); he is then invisible only to some people, to some of the inhabitants of the four cities on the four sides of Meru. He revolves round Meru, starting from the north side of Mount Lokâloka; he does not pass beyond Lokâloka, nor illuminate its south side. He is invisible during the night, because he is so far away. Man can see him at a distance of 1000 *yojana*, but when he is so far away, a small object sufficiently near to the eye can render him invisible to the spectator.

"When the sun stands in the zenith of Pushkara-Dvîpa, he moves along the distance of one-thirtieth part of the earth in three-fifths of an hour. In so much time he traverses 21 *laksha* and 50,000 *yojana*, *i.e.* 2,150,000 *yojana*. Then he turns to the north, and the distance he traverses becomes thrice as large. In consequence, the day becomes long. The distance which the sun traverses in a southern day is 9 *koṭi* and 10,045 *yojana*. When he then returns to the north and revolves round *Kshîra*, *i.e.* the Milky Way, his daily march is 1 *koṭi* and 21 *laksha yojana*."

Criticisms of the author on the theory of the *Matsya-Purâṇa*.

Now we ask the reader to consider how confused these expressions are. If the author of the *Matsya-Purâṇa* says "the stars pass as rapidly as an arrow," &c., we take this for a hyperbole intended for uneducated people; but we must state that the arrow-like motion of the stars is not peculiar to the south to the exclusion of the north. There are limits both in the north and south whence the sun returns, and the time of the sun's passing from the southern limit to the northern is equal to the time of his passing from the northern limit to the southern. Therefore his motion *northward* has the same right of being described as *as rapid as an arrow*. Herein, however, lies a hint of the theological opinion of the author regarding the north pole, for he thinks the north is the *above* and the south the *below*. Hence the stars glide down to the south like children on a see-saw plank. Page 143.

If, however, the author hereby means *the second motion*, whilst in reality it is the *first*, we must state that the stars in the *second motion* do not revolve round Meru, and that the plane of this motion is inclined towards the horizon of Meru by one-twelfth of the circle.

Further, how far-fetched is his simile in which he connects the motion of the sun with a burning beam! If we held the opinion that the sun moves as an uninterrupted round collar, his simile would be useful in so far as it refutes such an opinion. But as we consider the sun as a body, as it were, standing in heaven, his simile is meaningless. And if he simply means to say that the sun describes a round circle, his comparing the sun to a *burning beam* is quite superfluous, because a stone tied to the end of a cord describes a similar circle if it is made to revolve round the head (there being no necessity for describing it as burning).

That the sun rises over some people and sets over others, as he describes it, is true; but here, too, he is not free from his theological opinions. This is shown by his mention of the mountain Lokâloka and his remark that the rays of the sun fall on it, on its *human* or north side, not on its *wild* or south side.

Further, the sun is not hidden during the night on account of his great distance, but because he is covered by something—by the earth according to us, by Mount Meru according to the author of the *Matsya-Purâṇa.* He imagines that the sun marches round Meru, whilst we are on one of its sides. In consequence we are in a varying distance from the sun's path. That this is originally his opinion is confirmed by the later following remarks. That the sun is invisible during the night has nothing whatever to do with his distance from us.

The numbers which the author of the *Matsya-Purâṇa* mentions I hold to be corrupt, as they are not borne out by any calculation. He represents the path of the sun in the north as threefold that in the south, and makes this the cause of the difference of the length of the day. Whilst in reality the sum of day and night is always identical, and day and night in north and south stand in a constant relation to each other, it seems necessary that we should refer his remarks to a latitude where the summer-day is 45 *ghaṭikâ,* the winter-day 15 *ghaṭikâ* long.

Further, his remark that the sun hastens in the north (marches there more rapidly than in the south), requires to be proved. The places of northern latitude have meridians not very distant from each other, because of their being near to the pole, whilst the meridians become more distant from each other the nearer they are to the equator. If, now, the sun hastens in traversing a smaller distance, he wants less time than for traversing the greater distance, more especially if on this greater distance his march is slackening. In reality the opposite is the case.

By his phrase *when the sun revolves above Pushkara-dvîpa* (p. 284) is meant the line of the winter solstice.

According to him, on this line the day must be longer than in any other place, whether it be the summer solstice or another. All this is unintelligible.

Quotation from the *Vâyu-Purâṇa.*

Similar notions are also found in the *Vâyu-Purâṇa*, viz. "that the day in the south is twelve *muhûrta*, in the north eighteen, and that the sun between south and north has a declination of 17,221 *yojana* in 183 days, *i.e.* $94(\frac{19}{183})$ *yojana* for each day."

One *muhûrta* is equal to four-fifths of an hour (=48 minutes). The sentence of the *Vâyu-Purâṇa* applies to a latitude where the longest day is 14⅖ hours. Page 144.

As regards the numbers of the *yojanas* mentioned by the *Vâyu-Purâṇa*, the author means evidently the *portio* of the double declination of the sphere. According to him, the declination is twenty-four degrees; therefore the *yojanas* of the whole sphere would be 129,157½. And the days in which the sun traverses the double declination are half the solar year, no regard being had to the fractions of days, which are nearly five-eighths of a day.

Further, the *Vâyu-Purâṇa* says "that the sun in the north marches slowly during the day and rapidly during the night, and in the south *vice versâ*. Therefore the day is long in the north, even as much as eighteen *muhûrta*." This is merely the language of a person who has not the slightest knowledge of the eastern motion of the sun, and is not able to measure a day's arc by observation.

Quotation from the *Vishṇu-Dharma.*

The *Vishṇu-Dharma* says: "The orbit of the Great Bear lies under the pole; under it the orbit of Saturn; then that of Jupiter; next Mars, the Sun, Venus, Mercury, and the Moon. They rotate towards the east like a mill, in a uniform kind of motion which is peculiar to each star, some of them moving rapidly, others slowly. Death and life repeat themselves on them from eternity thousands of times."

If you examine this statement according to scientific principles, you will find that it is confused. Conceding that the Great Bear is *under* the pole and that the place of the pole is absolute height, the Great Bear lies *below* the zenith of the inhabitants of Meru. In this statement he is right, but he is mistaken with regard to the planets. For the word *below* is, according to him, to be understood so as to mean a greater or smaller distance from the earth; and thus taken, his statement (regarding the distances of the planets from the earth) is not correct, unless we suppose that Saturn has, of all planets, the greatest declination from the equator, the next greatest Jupiter, then Mars, the Sun, Venus, &c., and that at the same time this amount of their declination is a constant one. This, however, does not correspond to reality.

If we take the sum total of the whole statement of the *Vishṇu-Dharma*, the author is right in so far as the fixed stars are higher than the planets, but he is wrong in so far as the pole is not higher than the fixed stars.

The mill-like rotation of the planets is the *first motion* towards the west, not the *second motion* indicated by the author. According to him, the planets are the spirits of individuals who have gained exaltation by their merits, and who have returned to it after the end of their life in a human shape. According to my opinion, the author uses a number in the words *thousands of times* (p. 287), *either* because he wanted to intimate that their existence is an existence in our meaning of the term, an evolution out of the *δύναμις* into the *πρᾶξις* (hence something finite, subject to numeration or determination by measure), or because he meant to indicate that some of those spirits obtain *moksha*, others not. Hence their number is liable to a *more* or *less*, and everything of this description is of a finite nature.

CHAPTER XXVIII.

ON THE DEFINITION OF THE TEN DIRECTIONS.

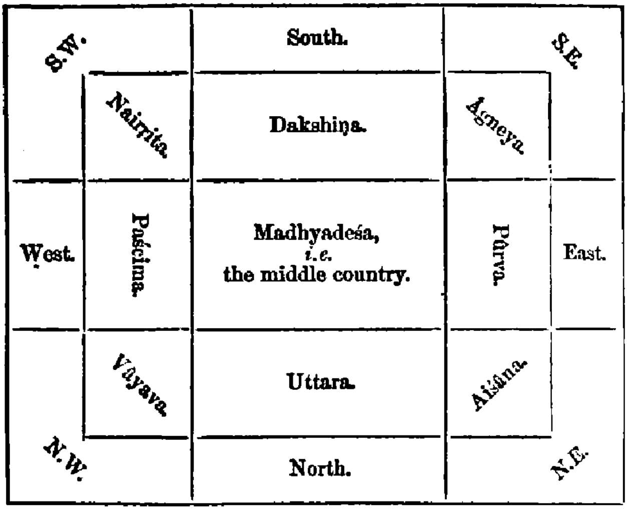
THE extension of bodies in space is in three directions: *length*, *breadth*, and *depth* or *height*. The path of any real direction, not an imaginary one, is limited; therefore the lines representing these three paths are limited, and their six end-points or limits are the *directions*. If you imagine an animal in the centre of these lines, *i.e.* where they cut each other, which turns its face towards one of them, the directions with relation to the animal are *before*, *behind*, *right*, *left*, *above*, and *below*.

If these directions are used in relation to the world, they acquire new names. As the rising and setting of Page 145. the heavenly bodies depend upon the horizon and the *first motion* becomes apparent by the horizon, it is the most convenient to determine the directions by the horizon. The four directions, *east*, *west*, *north*, *south* (corresponding to before, behind, left, and right), are generally known, but the directions which lie between each two of these are less known. These make eight directions, and, together with *above* and *below*, which do not need any further explanation, ten directions.

The Greeks determined the directions by the rising and setting places of the zodiacal signs, brought them into relation to the winds, and so obtained sixteen directions.

Also the Arabs determined the directions by the blowing-points of the winds. Any wind blowing between two cardinal winds they called in general *Nakbâ*. Only in rare cases they are called by special names of their own.

The Hindus, in giving names to the directions, have not taken any notice of the blowing of a wind; they simply call the four cardinal directions, as well as the secondary directions between them, by separate names. So they have eight directions in the horizontal plane, as exhibited by the following diagram:—


S.W.
South.
S.E.
Nairṛita
Dakshiṇa.
Âgneya
West.
Paścima.
Madhyadeśa,
i.e.
the middle country.
Pûrva.
East.
Vâyava
Uttara.
Aiśâna.
N.W.
North.
N.E.

Besides there are two directions more for the two poles of the horizontal plane, the *above* and *below*, the former being called *Upari*, the second *Adhas* and *Tala*.

These directions, and those in use among other nations, are based on general consent. Since the horizon is divided by innumerable circles, the directions also proceeding from its centre are innumerable. The two ends of every possible diameter may be considered as *before* and *behind*, and therefore the two ends of the diameter cutting the former at right angles (and lying in the same plane) are *right* and *left*.

The Hindus can never speak of anything, be it an object of the intellect or of imagination, without representing it as a personification, an individual. They at once marry him, make him celebrate marriage, make his wife become pregnant and give birth to something. So, too, in this case. The *Vishṇu-Dharma* relates that *Atri*, the star who rules the stars of the Great Bear, married *the directions*, represented as *one* person, though they are eight in number, and that from her the moon was born.

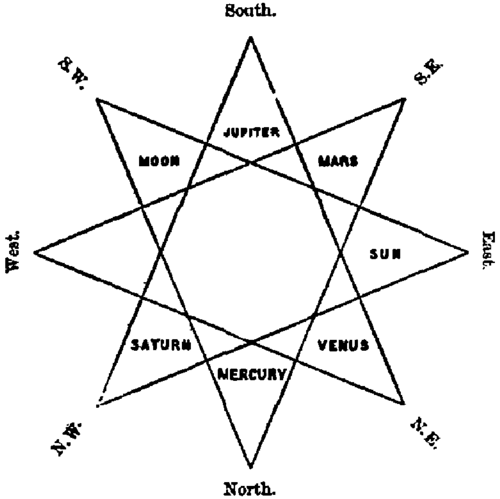
Another author relates: Dakska, *i.e.* Prajâpati, married Dharma, *i.e. the reward*, to ten of his daughters, *i.e.* the ten directions. From one of them he had many children. She was called *Vasu*, and her children the *Vasus*. One of them was the moon.

No doubt our people, the Muslims, will laugh at such a birth of the moon. But I give them still more of this stuff. Thus, *e.g.* they relate: The sun, the son of Kaśyapa and of Âditya, his wife, was born in the sixth Manvantara on the lunar station Viśâkhâ; the moon, the son of Dharma, was born on the station Kṛittikâ; Mars, the son of Prajâpati, on Pûrvâshâḍhâ; Mercury, the son of the moon, on Dhanishṭhâ; Jupiter, the son of Aṅgiras, Page 146. on Pûrvaphâlgunî; Venus, the daughter of Bhṛigu, on Pushya; Saturn on Revatî; the Bearer of the Tail, the son of Yama, the angel of death, on Âślesha, and the Head on Revatî.

According to their custom, the Hindus attribute certain dominants to the eight directions in the horizontal plane, which we exhibit in the following table:—

Their Dominants.	The Directions.	Their Dominants.	The Directions.
Indra, . . .	East.	Varuṇa, . .	West.
The Fire, .	S.E.	Vâyu, . .	N.W.
Yama, . .	South.	Kuru, . .	North.
Pṛithu, . .	S.W.	Mahâdeva, .	N.E.

The Hindus construct a figure of these eight directions, called *Râhucakra, i.e.* the figure of the Head, by means of which they try to gain an omen or prophecy for hazard-playing. It is the following diagram:—


South.
S.W.
S.E.
JUPITER
MOON
MARS
West.
SUN
East.
SATURN
VENUS
MERCURY
N.W.
N.E.
North.

The figure is used in this way: First, you must know the dominant of the day in question, and its place in the present figure. Next you must know that one of the eight parts of the day in which you happen to be. These eighths are counted on the lines, beginning with the dominant of the day, in uninterrupted succession from east to south and west. Thus you find the dominant of the eighth in question. If, *e.g.*, you want to know the fifth eighth of Thursday whilst Jupiter is the *dominus diei* in the south, and the line proceeding from the south terminates in north-west, we find that the dominant of the first eighth is Jupiter, that of the second is Saturn, that of the third the sun, that of the fourth the moon, and that of the fifth Mercury in the north. In this way you go on counting the eighths through the day and the night till the end of the *νυχθήμερον*. When thus the direction of the eighth of the day in which you are has been found, it is considered Page 147. by them as Râhu; and when sitting down to play, you must place yourself so that you have this direction at your back. Then you will win, according to their belief. It is no affair of the reader to despise a man who, on account of such an omen, in a variety of games stakes all his chances on one cast of the dice. Suffice it to leave to him the responsibility of his dice-playing.

CHAPTER XXIX.

DEFINITION OF THE INHABITABLE EARTH ACCORDING TO THE HINDUS.

The Ṛishi Bhuvanakośa on the inhabitable world.

In the book of the Ṛishi Bhuvanakośa we read that the inhabitable world stretches from Himavant towards the south, and is called *Bharata-varsha*, so called from a man, Bharata, who ruled over them and provided for them. The inhabitants of this *οἰκουμένη* are those to whom alone reward and punishment in another life are destined. It is divided into nine parts, called *Nava-khaṇḍa-prathama, i.e.* the primary nine parts. Between each two parts there is a sea, which they traverse from one *khaṇḍa* to the other. The breadth of the inhabitable world from north to south is 1000 *yojana*.

By Himavant the author means the northern mountains, where the world, in consequence of the cold, ceases to be inhabitable. So all civilisation must of necessity be south of these mountains.

His words, that the inhabitants are subject to *reward and punishment*, indicate that there are other people *not* subject to it. These beings he must either raise from the degree of man to that of angels, who, in consequence of the simplicity of the elements they are composed of and of the purity of their nature, never disobey a divine order, being always willing to worship; or he must degrade them to the degree of irrational animals. According to him, therefore, there are no human beings outside the *οἰκουμένη* (*i.e. Bharata-varsha*).

Bharatavarsha is not India alone, as Hindus think, according to whom *their* country is the world, and their race the only race of mankind; for India is not traversed by an ocean separating one *khaṇḍa* from the other. Further, they do not identify these *khaṇḍa* with the *dvîpas*, for the author says that on those seas people pass from one shore to the other. Further, it follows from his statement that all the inhabitants of the earth and the Hindus are subject to reward and punishment, that they are one great religious community.

The nine parts are called *Prathama*, *i.e. primary* ones, because they also divide India alone into nine parts. So the division of the *οἰκουμένη* is a *primary* one, but the division of Bharatavarsha a *secondary* one. Besides, there is still a third division into nine parts, as their astrologers divide each country into nine parts when they try to find the lucky and unlucky places in it.

Quotation from *Vâyu-Purâṇa.*

We find a similar tradition in the *Vâyu-Purâṇa*, viz. that "the centre of Jambu-dvîpa is called Bharatavarsha, which means those *who acquire something and nourish themselves.* With them there are the four *yuga*. They are subject to reward and punishment; and Himavant lies to the north of the country. It is divided into nine parts, and between them there are navigable seas. Its length is 9000 *yojana*, its breadth 1000; and because the country is also called Samnâra (?), each ruler who rules it is called Samnâra (?). The shape of its nine parts is as follows."

Then the author begins to describe the mountains in the *khaṇḍa* between the east and north, and the rivers which rise there, but he does not go beyond this description. Thereby he gives us to understand that, according to his opinion, this *khaṇḍa* is the *οἰκουμένη*. Page 148.
But he contradicts himself in another place, where he

says that Jambu-dvîpa is the centre among the *Nava-khaṇḍa-prathama*, and the others lie towards the eight directions. There are angels on them, men, animals, and plants. By these words he seems to mean the *dvîpas*.

If the breadth of the *οἰκουμένη* is 1000 *yojana*, its length must be nearly 2800.

Further, the *Vâyu-Purâṇa* mentions the cities and countries which lie in each direction. We shall exhibit them in tables, together with similar information from other sources, for this method renders the study of the subject easier than any other.

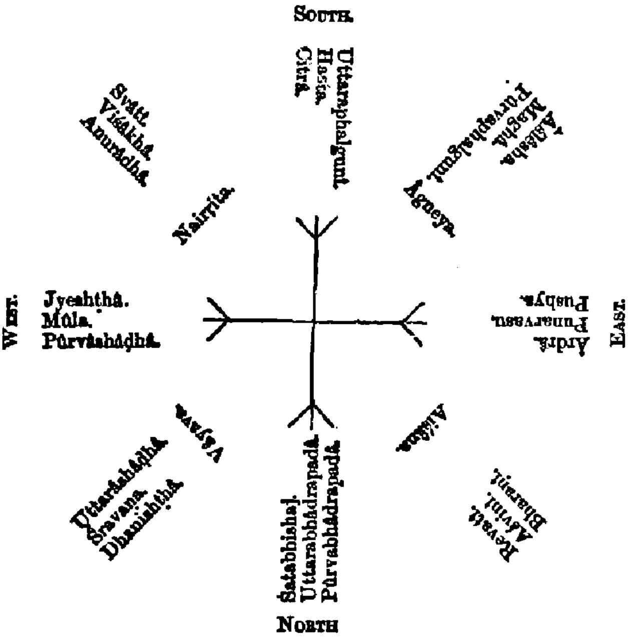
Here follows a diagram representing the division of Bharatavarsha into nine parts.

Nâgadvîpa.	South. Gabhastimat.	Tâmravarṇa.
West. Saumya.	Indradvîpa or Madhyadêśa, *i.e.* the middle country.	Kaśerumat. East.
Gândharva.	North.	Nagarasaṁvṛitta.

On the figure *Kûrma-cakra.*

We have already heretofore mentioned that that part of the earth in which the *οἰκουμένη* lies resembles a tortoise, because its borders are round, because it rises above the water and is surrounded by the water, and because it has a globular convexity on its surface. However, there is a possibility that the origin of the name is this, that their astronomers and astrologers divide the directions according to the lunar stations.

Therefore the country, too, is divided according to the lunar stations, and the figure which represents this division is similar to a tortoise. Therefore it is called *Kûrma-cakra, i.e.* the tortoise-çircle or the tortoise-shape. The following diagram is from the *Saṁhitâ* of Varâhamihira.


South.
Uttaraphalgunî.
Hasta.
Citrâ.
Pûrvaphalgunî.
Maghâ.
Aślesha.
Âgneya.
Pushya.
Punarvasu.
Ardrâ.
East.
Aiśâna.
Revatî.
Aśvinî.
Bharanî.
Śatabhishaj.
Uttarabhâdrapadâ.
Pûrvabhâdrapadâ.
North
Vâyava.
Uttarâshâḍhâ.
Śravaṇa.
Dhanishṭhâ.
West.
Jyeshṭhâ.
Mûla.
Pûrvâshâḍhâ.
Nairrita.
Svâti.
Viśâkhâ.
Anurâdhâ.

Page 149. The division of Bharatavarsha according to Varâhamihira.

Varâhamihira calls each of the *Nava-khaṇḍa* a *varga.* He says: "By them (the *vargas*) Bharatavarsha, *i.e.* half of the world, is divided into nine parts, the central one, the eastern, &c." Then he passes to the south, and thus round the whole horizon. That he understands by Bharatavarsha India alone is indicated by his saying that each *varga* has a region, the king of which is killed when some mishap befalls it. So belong

To the	1st or central varga,	the region	Pâñcâla.
,,	2d varga,	,,	Magadha.
,,	3d varga,	,,	Kaliṅga.
,,	4th varga,	,,	Avanti, *i.e.* Ujain.
,,	5th varga,	,,	Ananta.
,,	6th varga,	,,	Sindhu and Sauvîra.
,,	7th varga,	,,	Hârahaura.
,,	8th varga,	,,	Madura.
,,	9th varga,	,,	Kulinda.

All these countries are parts of India proper.

On the change of geographical names.

Most of the names of countries under which they appear in this context are not those by which they are now generally known. Utpala, a native of Kashmîr, says in his commentary on the book *Saṁhitâ* regarding this subject: "The names of countries change, and particularly in the *yugas*. So Mûltân was originally called Kâśyapapura, then Haṁsapura, then Bagapura, then Sâmbhapura, and then *Mûlasthâna*, i.e. *the original place*, for *mûla* means root, origin, and *tâna* means place."

A *yuga* is a long space of time, but names change rapidly, when, for instance, a foreign nation with a different language occupies a country. Their tongues frequently mangle the words, and thus transfer them into their own language, as is, *e.g.* the custom of the Greeks. Either they keep the original meaning of the names, and try a sort of translation, but then they undergo certain changes. So the city of Shâsh, which has its name from the Turkish language, where it is called Tâsh-kand, *i.e. stone-city*, is called *stone-tower* in the book *γεωγραφία*. In this way new names spring up as translations of older ones. Or, secondly, the barbarians adopt and keep the local names, but with such sounds and in such forms as are adapted to their tongues, as the Arabs do in Arabising foreign names, which become disfigured in their mouth: *e.g. Bûshang* they call in their books *Fûsanj*, and *Sakilkand* they call in their revenue-books *Fârfaza* (*sic*). However, what is more curious and strange is this, that sometimes one and the same language changes in the mouth of the same people who speak it, in consequence of which strange and uncouth forms of words spring up, not intelligible save to him who discards every rule of the language. And such changes are brought about in a few years, without there being any stringent cause or necessity for it. Of course, in all of this the Hindus are actuated by the desire to have as many names as possible, and to practise on them the rules and arts of their etymology, and they glory in the enormous copiousness of their language which they obtain by such means.

The following names of countries, which we have taken from the *Vâyu-Purâṇa*, are arranged according to the four directions, whilst the names taken from the *Saṁhitâ* are arranged according to the eight directions. All these names are of that kind which we have here described (*i.e.* they are not the names now in general use). We exhibit them in the following tables:—

The single countries of the middle realm, according to the Vâyu-Purâṇa. Page 150.

Kuru, Pâñcâla, Sâlva, Jaṅgala, Śûrasena, Bhadrakâra (!), Bodha, Patheśvara, Vatsa, Kisadya, Kulya, Kuntala, Kâśi, Kośala, Arthayâshava (?), Puhliṅga (!), Mashaka (!), Vṛika.

The people in the east:—

Andhra, Vâka, Mudrakaraka (?), Prâtragira (?), Vahirgira, Prathanga (?), Vaṅgeya, Mâlava (!), Mâlavartika, Prâgjyotisha, Muṇḍa, Âbika (?), Tâmraliptika, Mâla, Magadha, Govinda (Gonanda ?).

The people in the south:—

Pâṇḍya, Kerala, Caulya, Kulya, Setuka, Mûshika, Rumana (?), Vanavâsika, Mahârâshtra, Mâhisha, Kaage 151. liṅga, Abhîra, Îshîka, Âṭavya, Śavara (?), Pulindra, Vindhyamûli, Vaidarbha, Daṇḍaka, Mûlika (!), Asmaka, Naitika (!), Bhogavardhana, Kuntala, Andhra, Udbhira, Nalaka, Alika, Dâkshinâtya, Vaideśa, Sûrpâkâraka, Kolavana, Durga, Tillîta (?), Puleya, Krâla (!), Rûpaka, Tâmasa, Tarûpana (?), Karaskara, Nâsikya, Uttaranarmada, Bhânukacchra (?), Maheya, Sâraswata (?), Kacchîya, Surâshtra, Anartta, Hudvuda (?).

The people in the west:—

Malada (?), Karûsha, Mekala, Utkala, Uttamarṇa, Baśârṇa (?), Bhoja, Kishkinda, Kosala, Traipura, Vaidika, Tharpura (?), Tumbura, Shattumâna (?), Padha, Kar- Page 152. ṇaprâvaraṇa (!), Hûna, Darva, Hûhaka (!), Trigartta, Mâlava, Kirâta, Tâmara.

The people in the north:—

Vâhlîka (!), Vâḍha, Vâna (?), Âbhîra, Kalatoyaka, Aparânta (?), Pahlava, Carmakhaṇḍika, Gândhâra, Yavana, Sindhu, Sauvîra, *i.e.* Multân and Jahrâwâr, Madhra (?), Śaka, Drihâla (?), Litta (Kulinda), Malla (?), Kodara (?), Âtreya, Bharadva, Jâṅgala, Daseruka (!), Lampâka, Tâlakûna (?), Sûlika, Jâgara.

The names of the countries for the tortoise-figure, as taken from the Saṁhitâ of Varâhamihira.

I. The names of the countries in the centre of the realm:—

Bhadra, Ari, Meda, Mâṇḍavya, Sâlvanî, Pojjihâna, Maru, Vatsa, Ghosha, the valley of the Yamunâ, Sârasvata, Matsya, Mâthura, Kopa, Jyotisha, Dharmâraṇya, Śûrasena, Gauragrîva, Uddehika near Bazâna, Pâṇḍu, Page 153. Guḍa = Tânêshar, Aśvattha, Pañcâla, Sâketa, Kaṇka, Kuru = Tânêshar, Kâlkoṭi, Kukura, Pariyâtra, Audumbara, Kapishṭhala, Gaja.

II. The names of the countries in the east:—

Añjana, Vṛishabadhvaja, Padma-Tulya (*sic*), Vyâghramukha, *i.e.* people with tiger-faces, Suhma, Karvaṭa, Candrapura, Śûrpakarṇa, *i.e.* people with ears like sieves, Khasha, Magadha, Mount Śibira, Mithilâ, Samataṭa, Oḍra, Aśvavadana, *i.e.* people with horse-faces, Dantura, *i.e.* people with long teeth, Prâgjyotisha, Lohitya, Krîra-samudra (*sic*), *i.e.* the milk-sea, Purushâda, Udayagiri, *i.e.* the mountain of sunrise, Bhadra, Gauraka, Pauṇḍra, Utkala, Kâśi, Mekala, Ambashṭha, Ekapada, *i.e.* the one-footed people, Tâmaliptikâ, Kausalaka, Vardhamâna.

III. The names of the countries of the south-east (*Âgneya*):—

Kosala, Kaliṅga, Vaṅga, Upavaṅga, Jaṭhara, Aṅga, Saulika, Vidarbha, Vatsa, Andhra, Colika (?), Ûrdhvakarṇa, *i.e.* people whose ears are directed upwards, Vṛisha, Nâlikera, Carmadvîpa, the mountain Vindhya, Tripurî, Śmaśrudhara, Hemakûṭya, Vyâlagrîva, *i.e.* Page 154. people whose bosoms are snakes, Mahâgrîva, *i.e.* people who have wide bosoms, Kishkindha, the country of the monkeys, Kaṇḍakasthala, Nishâda, Râshṭra, Dâśârṇa, Purika, Nagnaparṇa, Śavara.

IV. The names of the countries in the south:—

Laṅkâ, *i.e.* the cupola of the earth, Kâlâjina, Sairîkîrṇa (?), Tâlikaṭa, Girnagara, Malaya, Dardura, Mahendra, Mâlindya, Bharukaccha, Kankaṭa, Taṅkaṇa, Vanavâsi on the coast, Śibika, Phaṇikâra, Koṅkana near the sea, Âbhîra, Âkara, Veṇâ a river, Avanti, *i.e.* the city of Ujain, Daśapura, Gonarda, Keralaka, Karṇâṭa, Mahâṭavi, Citrakûṭa, Nâsikya, Kollagiri, Cola, Krauñcadvîpa, Jaṭâdhara, Kauverya, Ṛishyamûka, Vaiḍûrya, Śaṅkha, Mukta, Atri, Vâricara, Jarmapaṭṭana (*sic*), Dvîpa, Gaṇarâjya, Kṛishṇavaiḍûrya, Śibika, Sûryâdri, Kuśumanaga, Tumbavana, Kârmaṇeyaka, Yâmyodadhi, Page 155. Tâpasâśrama, Ṛishika, Kâñcî, Marucîpaṭṭana, Dîvârśa (!), Siṁhala, Ṛishabha, Baladevapaṭṭana, Daṇḍakâvaṇa, Timingilâśana (?), Bhadra, Kaccha, Kuñjaradarî, Tâmraparṇa.

V. The names of the countries in the south-west (*Nairṛita*):—

Kâmboja, Sindhu, Sauvîra, *i.e.* Multan and Jahrâvâr, Vaḍavâmukha, Âravâmbashṭha, Kapila, Pâraśava, *i.e.* the Persians, Sûdra, Barbara, Kirâta, Khaṇḍa, Kravya, Âbhîra, Cañcûka, Hemagiri, Sindhu, Kâlaka, Raivataka, Surâshṭra, Bâdara, Dramiḍa, Mahârṇava, Nârîmukha, *i.e.* men with women's faces, *i.e.* the Turks, Ânarta, Pheṇagiri, Yavana, *i.e.* the Greeks, Mâraka, Karṇaprâvaraṇa.

VI. The names of the countries in the west:—

Maṇimân, Meghavân, Vanaugha, Astagiri, *i.e.* the country of sunset, Aparântaka, Sântika, Haihaya, Praśastâdri, Vokkâṇa, Pañcanada, *i.e.* the union of the five rivers, Maṭhara, Pârata, Târakruti (?), Jṛinga, Vaiśya, Kanaka, Śaka, Mleccha, *i.e.* the Arabs.

VII. The names of the countries in the north-west (*Vâyava*):—

Page 156. Mâṇḍavya, Tukhâra, Tâlahala, Madra, Aśmaka, Kulûtalahaḍa, Strîrâjya, *i.e.* women amongst whom no man dwells longer than half a year, Nṛisiṁhavana, *i.e.* people with lion-faces, Khastha, *i.e.* people who are born from the trees, hanging on them by the navel-strings, Veṇumatî (?), *i.e.* Tirmidh, Phalgulu, Guruhâ, Marukucca, Carmaraṅga, *i.e.* people with coloured skins, Ekavilocana, *i.e.* the one-eyed men, Sûlika, Dîrghagrîva, *i.e.* people with long bosoms, which means with long necks, Dîrghamukha, *i.e.* people with long faces, Dîrghakeśa, *i.e.* people with long hair.

VIII. The names of the countries in the north:—

Kailâsa, Himavant, Vasumant, Giri, Dhanushman (!), *i.e.* the people with bows, Krauñca, Meru, Kurava, Uttarakurava, Kshudramîna, Kaikaya, Vasâti, Yâmuna, *i.e.* a kind of Greeks, Bhogaprastha, Ârjunâyana, Agnitya, Âdarśa, Antardvîpa, Trigarta, Turagânana, *i.e.* people with horse-faces, Śvamukha, *i.e.* people with dog-faces, Keśadhara, Capiṭanâsika, *i.e.* flat-noses, Dâsera, Kavâṭadhâna, Śaradhâna, Takshaśila, *i.e.* Mârikala, Pushkalâvatî, *i.e.* Pûkala, Kailâvata, Kaṇṭhadhâna, Ambara, Madraka, Mâlava, Paurava, Kacchâra, Daṇḍa, Piṅgalaka, Mânahala, Hûṇa, Kohala, Śâtaka, Mâṇḍavya, Bhûtapura, Gândhâra, Yaśovati, Hematâla, Râjanya, Khajara, Yaudheya, Dâsameya, Śyâmâka, Kshemadhûrta (?).

IX. The names of the countries in the north-east (*Aiśâna*):—

Meru, Kanashṭharâjya, Paśupâla, Kîra, Kaśmîra, Abhi, Śârada, Taṅgaṇa, Kulûta, Sairindha, Râshṭra, Brahmapura, Dârva, Dâmara, Vanarâjya, Kirâta, Cîna, Kauṇinda, Bhalla, Palola, Jaṭâsura, Kunaṭha, Khasha, Ghosha, Kucika, Ekacaraṇa, *i.e.* the one-footed people, Anuviśva, Suvarṇabhûmi, *i.e.* the gold land, Arvasudhana (*sic*), Nandavishṭha, Paurava, Cîranivasana, Trinetra, *i.e.* people with three eyes, Puñjâdri, Gandharva. Page 157.

On Romaka, Yamakoṭi, and Siddhapura.

Hindu astronomers determine the longitude of the inhabitable world by Laṅkâ, which lies in its centre on the equator, whilst Yamakoṭi lies on its east, Romaka on its west, and Siddhapura on that part of the equator which is diametrically opposed to Laṅkâ. Their remarks on the rising and setting of the heavenly bodies show that Yamakoṭi and Rûm are distant from each other by half a circle. It seems that they assign the countries of the West (*i.e.* North Africa) to Rûm or the Roman Empire, because the Rûm or Byzantine Greeks occupy the opposite shores of the same sea (the Mediterranean); for the Roman Empire has much northern latitude and penetrates high into the north. No part of it stretches far southward, and, of course, nowhere does it reach the equator, as the Hindus say with regard to Romaka.

We shall here speak no more of Laṅkâ (as we are going to treat of it in a separate chapter). Yamakoṭi is, according to Ya'ḳûb and Alfazârî, the country where is the city *Târa* within a sea. I have not found the slightest trace of this name in Indian literature. As *koṭi* means *castle* and Yama is the angel of death, the word reminds me of Kangdiz, which, according to the Persians, had been built by Kaikâ'ûs or Jam in the most remote east, behind the sea. Kaikhusrau traversed the sea to Kangdiz when following the traces of Afrâsiâb the Turk, and there he went at the time of his anchorite life and expatriation. For *diz* means in Persian *castle*, as *koṭi* in the Indian language. Abû-Ma'shar of Balkh has based his geographical canon on Kangdiz as the 0° of longitude or first meridian.

How the Hindus came to suppose the existence of Siddhapura I do not know, for they believe, like ourselves, that behind the inhabited half-circle there is nothing but unnavigable seas.

The meridian of Ujain the first meridian.

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In what way the Hindus determine the latitude of a place has not come to our knowledge. That the longitude of the inhabitable world is a half-circle is a far-spread theory among their astronomers; they differ (from Western astronomers) only as to the point which is to be its beginning. If we explain the theory of the Hindus as far as we understand it, their beginning of longitude is Ujain, which they consider as the eastern limit of one quarter (of the *οἰκουμένη*), whilst the limit of the second quarter lies in the west at some distance from the end of civilisation, as we shall hereafter explain in the chapter about the difference of the longitudes of two places.

Other first meridians used by Western astronomers.

The theory of the Western astronomers on this point is a double one. Some adopt as the beginning of longitude the shore of the (Atlantic) ocean, and they extend the first quarter thence as far as the environs of Balkh. Now, according to this theory, things have been united which have no connection with each other. So Shapûrḳân and Ujain are placed on the same meridian. A theory which so little corresponds to reality is quite valueless. Others adopt the *Islands of the Happy Ones* as the beginning of longitude, and the quarter of the *οἰκουμένη* they extend thence as far as the neighbourhood of Jurjân and Nîshâpûr. Both these theories are totally different from that of the Hindus. This subject, however, shall be more accurately investigated in a subsequent chapter (p. 311).

If I, by the grace of God, shall live long enough, I shall devote a special treatise to the longitude of Nîshâpûr, where this subject shall be thoroughly inquired into.

CHAPTER XXX.

ON LAṄKÂ, OR THE CUPOLA OF THE EARTH.

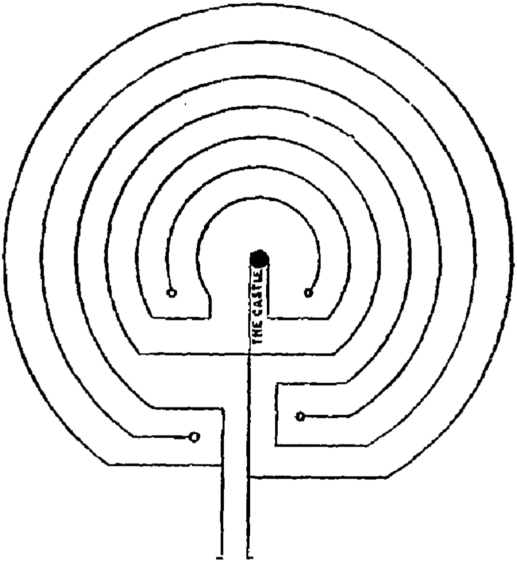
On the meaning of the term *cupola of the earth*.

The midst of the inhabitable world, of its longitudinal extension from east to west on the equator, is by the astronomers (of the Muslims) called the *cupola of the earth*, and the *great* circle which passes through the pole and this point of the equator is called the *meridian of the cupola*. We must, however, observe that whatever may be the natural form of the earth, there is no place on it which to the exclusion of others deserves the name of a *cupola*; that this term is only a metaphorical one to denote a point from which the two ends of the inhabitable world in east and west are equidistant, comparable to the top of a cupola or a tent, as all things hanging down from this top (tent-ropes or walls) have the same length, and their lower ends the same distances therefrom. But the Hindus never call this point by a term that in our language must be interpreted by *cupola*; they only say that Laṅkâ is between the two ends of the inhabitable world and without latitude.

The story of Râma.

There Râvaṇa, the demon, fortified himself when he had carried off the wife of Râma, the son of Daśaratha. His labyrinthine fortress is called ثنكت رز (?), whilst in our (Muslim) countries it is called *Yâvana-koṭi*, which has frequently been explained as Rome.

The following is the plan of the labyrinthine fortress:—



Door of the road leading to the castle.

Râma attacked Râvaṇa after having crossed the Page 159. ocean on a dyke of the length of 100 *yojana*, which he had constructed from a mountain in a place called *Setubandha*, *i.e.* bridge of the ocean, east of Ceylon. He fought with him and killed him, and Râma's brother killed the brother of Râvaṇa, as is described in the story of Râma and Râmâyana. Thereupon he broke the dyke in ten different places by arrow-shots.

According to the Hindus, Laṅkâ is the castle of the On the island of Laṅkâ. demons. It is 30 *yojana* above the earth, *i.e.* 80 *farsakh*. Its length from east to west is 100 *yojana*; its breadth from north to south is the same as the height (*i.e.* thirty).

It is on account of Laṅkâ and the island of Vaḍavâmukha that the Hindus consider the south as foreboding evil. In no work of piety do they direct themselves southward or walk southward. The south occurs only in connection with impious actions.

The first meridian.

The line on which the astronomical calculations are based (as 0° of longitude), which passes in a straight line from Lankâ to Meru, passes—

(1.) Through the city of Ujain (Ujjayinî) in Mâlava (Mâlvâ).

(2.) Through the neighbourhood of the fortress Rohitaka in the district of Multân, which is now deserted.

(3.) Through Kurukshetra, *i.e.* the plain of Tâneshar (Sthâneśvara), in the centre of their country.

(4.) Through the river Yamunâ, on which the city of Mathurâ is situated.

(5.) Through the mountains of the Himavant, which are covered with everlasting snow, and where the rivers of their country rise. Behind them lies Mount Meru.

The situation of Ujain.

The city of Ujain, which in the tables of the longitudes of places is mentioned as *Uzain*, and as situated on the sea, is in reality 100 *yojana* distant from the sea. Some undiscriminating Muslim astronomer has uttered the opinion that Ujain lies on the meridian of Al-shabûrkân in Al-jûzajân; but such is not the case, for it lies by many degrees of the equator more to the east than Al-shabûrkân. There is some confusion about the longitude of Ujain, particularly among such (Muslim) astronomers as mix up with each other the different opinions about the first degree of longitude both in east and west, and are unable to distinguish them properly.

The author's conjecture about Lankâ and Langabâlûs.

No sailor who has traversed the ocean round the place which is ascribed to Lankâ, and has travelled in that direction, has ever given such an account of it as tallies with the traditions of the Hindus or resembles them. In fact, there is no tradition which makes the thing appear to us more possible (than it is according to the reports of the Hindus). The name Lankâ, however, makes me think of something entirely different, viz. that the clove is called *lavang*, because it is imported from a country called *Langa*. According to the uniform report of all sailors, the ships which are sent to this country land their cargo in boats, viz. ancient Western *denars* and various kinds of merchandise, striped Indian cloth, salt, and other usual articles of trade. These wares are deposited on the shore on leather sheets, each of which is marked with the name of its owner. Thereupon the merchants retire to their ships. On the following day they find the sheets covered with cloves by way of payment, little or much, as the natives happen to own.

The people with whom this trade is carried on are demons according to some, savage men according to others.

A certain wind as the cause of small-pox.

The Hindus who are the neighbours of those regions (of Laṅkâ) believe that the small-pox is a wind blowing from the island of Laṅkâ towards the continent to carry off souls. According to one report, some men warn people beforehand of the blowing of this wind, and can exactly tell at what times it will reach the different parts of the country. After the small-pox has broken out, they recognise from certain signs whether it is virulent or not. Against the virulent small-pox they use a method of treatment by which they destroy only one single limb of the body, but do not kill. They use as medicine cloves, which they give to the patient to drink, together with gold-dust; and, besides, the males tie the cloves, which are similar to date-kernels, to their necks. If these precautions are taken, perhaps nine people out of ten will be proof against this malady. Page 160.

All this makes me think that the Laṅkâ which the Hindus mention is identical with the clove-country Langa, though their descriptions do not tally. However, there is no communication kept up with the latter, for people say that when perchance a merchant is left behind on this island, there is no more trace found of him. And this my conjecture is strengthened by the fact that, according to the book of Râma and Râmâyana, behind the well-known country of Sindh there are cannibals. And, on the other hand, it is well known among all seamen that cannibalism is the cause of the savagery and bestiality of the inhabitants of the island of Langabâlûs.

CHAPTER XXXI.

ON THAT DIFFERENCE OF VARIOUS PLACES WHICH WE CALL THE DIFFERENCE OF LONGITUDE.

On the Hindu method of determining longitude.

HE who aims at accuracy in this subject must try to determine the distance between the spheres of the meridians of the two places in question. Muslim astronomers reckon by *equatorial times* corresponding to the distance between the two meridians, and begin to count from one (the western one) of the two places. The sum of equatorial minutes which they find is called *the difference between the two longitudes;* for they consider as the *longitude* of each place the distance of its meridian from *the great circle* passing through the pole of the equator, which has been chosen as the limit of the *οἰκουμένη*, and for this first meridian they have chosen the *western* (not the eastern) limit of the *οἰκουμένη*. It is all the same whether these *equatorial times*, whatsoever their number for each meridian may be, are reckoned as 360th parts of a circle, or as its 60th parts, so as to correspond to the *day-minutes*, or as *farsakh* or *yojana*.

The Hindus employ in this subject methods which do not rest on the same principle as ours. They are totally different; and howsoever different they are, it is perfectly clear that none of them hits the right mark. As we (Muslims) note for each place its *longitude*, the Hindus note the number of *yojanas* of its distance from the meridian of Ujain. And the more to the west the position of a place is, the greater is the number of *yojanas;* the more to the east it is, the smaller is this number. They call it *deśântara,* i.e. *the difference between the places.* Further, they multiply the *deśântara* by the mean daily motion of *the planet* (the sun), and divide the product by 4800. Then the quotient represents that amount of the motion of the star which corresponds to the number of *yojana* in question, *i.e.* that which must be added to the mean place of the sun, as it has been found for moon or midnight of Ujain, if you want to find the longitude of the place in question.

On the circumference of the earth.

The number which they use as divisor (4800) is the number of the *yojanas* of the circumference of the earth, for the difference between the spheres of the meridians of the two places stands in the same relation to the whole circumference of the earth as the mean motion of the planet (sun) from one place to the other to its whole daily rotation round the earth.

If the circumference of the earth is 4800 *yojanas,* the diameter is nearly 1527; but Pulisa reckons it as 1600, Brahmagupta as 1581 *yojanas,* each of which is equal to eight miles. The same value is given in the astronomical handbook *Al-arkand* as 1050. This number, however, is, according to Ibn Ṭârik, the radius, whilst the diameter is 2100 *yojanas,* each *yojana* being reckoned as equal to four miles, and the circumference is stated as $6596\frac{9}{25}$ *yojanas.*

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Quotations from the *Khaṇḍakhâdyaka* and the *Karaṇatilaka.*

Brahmagupta uses 4800 as the number of *yojanas* of the earth's circumference in his canon *Khaṇḍakhâdyaka,* but in the amended edition he uses, instead of this, the *corrected* circumference, agreeing with Pulisa. The correction he propounds is this, that he multiplies the *yojanas* of the earth's circumference by the *sines* of the complement of the latitude of the place, and divides the product by the *sinus totus;* then the quotient is the *corrected* circumference of the earth, or the number of *yojanas* of the parallel circle of the place in question. Sometimes this number is called *the collar of the meri-*

dian. Hereby people are frequently misled to think that the 4800 *yojanas* are the *corrected* circumference for the city of Ujain. If we calculate it (according to Brahmagupta's correction), we find the latitude of Ujain to be 16¼ degrees, whilst in reality it is 24 degrees.

The equation *vyastatrairâśika.*

The author of the canon *Karaṇa-tilaka* makes this correction in the following way. He multiplies the diameter of the earth by 12 and divides the product by the equinoctial shadow of the place. The gnomon stands in the same relation to this shadow as the radius of the parallel circle of the place to the sine of the latitude of the place, not to the *sinus totus.* Evidently the author of this method thinks that we have here the same kind of equation as that which the Hindus call *vyastatrairâśika,* i.e. *the places with the retrograde motion.* An example of it is the following.

If the price of a harlot of 15 years be, *e.g.* 10 denars, how much will it be when she is 40 years old?

The method is this, that you multiply the first number by the second (15 × 10 = 150), and divide the product by the third number (150 : 40 = 3¾). Then the quotient or fourth number is her price when she has become old, viz. 3¾ denars.

Now the author of the *Karaṇa-tilaka,* after having found that the straight shadow *increases* with the latitude, whilst the diameter of the circle *decreases,* thought, according to the analogy of the just mentioned calculation, that between this increase and decrease there is a certain *ratio.* Therefore he maintains that the diameter of the circle *decreases, i.e.* becomes gradually smaller than the diameter of the earth, at the same rate as the straight shadow *increases.* Thereupon he calculates the corrected circumference from the corrected diameter.

After having thus found the longitudinal difference between two places, he observes a lunar eclipse, and fixes in day-minutes the difference between the time of its appearance in the two places. Pulisa multiplies these day-minutes by the circumference of the earth, and divides the product by 60, viz. the minutes (or 60th parts) of the daily revolution. The quotient, then, is the number of the *yojanas* of the distance between the two places.

This calculation is correct. The result refers to the *great circle* on which Lankâ lies.

Brahmagupta calculates in the same manner, save that he multiplies by 4800. The other details have already been mentioned.

Calculation of the *deśântara* according to Alfazârî.

As far as this, one clearly recognises what the Hindu astronomers aim at, be their method correct or faulty. However, we cannot say the same of their calculation of the *deśântara* from the latitudes of two different places, which is reported by Alfazârî in his canon in the following manner:—

"Add together the squares of the sines of the latitudes of the two places, and take the root of the sum. This root is the *portio*.

"Further, square the difference of these two sines and add it to the *portio*. Multiply the sum by 8 and divide the product by 377. The quotient, then, is the distance between the two places, that is to say, according to a rough calculation.

"Further, multiply the difference between the two latitudes by the *yojanas* of the circumference of the earth and divide the product by 360."

Evidently this latter calculation is nothing but the transferring of the difference between the two latitudes from the measure of degrees and minutes to the measure of *yojanas*. Then he proceeds:—

"Now the square of the quotient is substracted from the square of the roughly calculated *distance*, and of the remainder you take the root, which represents the *straight yojanas*."

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Evidently the latter number represents the distance between the spheres of the *meridians* of the two places on the circle of latitude, whilst the *roughly calculated* number is the distance between the two places in longitude.

The author criticises this method.

This method of calculation is found in the astronomical handbooks of the Hindus in conformity with the account of Alfazârî, save in one particular. The here-mentioned *portio* is the *root* of the difference between the squares of the sines of the two latitudes, not *the sum* of the squares of the sines of the two latitudes.

But whatever this method may be, it does not hit the right mark. We have fully explained it in several of our publications specially devoted to this subject, and there we have shown that it is impossible to determine the distance between two places and the difference of longitude between them by means of their latitudes alone, and that only in case one of these two things is known (the distance between two places or the difference between the longitudes of them), by this and by means of the two latitudes, the third value can be found.

Another calculation of the *deśântara.*

Based on the same principle, the following calculation has been found, there being no indication by whom it was invented :—

"Multiply the *yojanas* of the distance between two places by 9, and divide the product by (*lacuna*); the root of the difference between its square and the square of the difference of the two latitudes. Divide this number by 6. Then you get as quotient the number of day-minutes of the difference of the two longitudes."

It is clear that the author of this calculation first takes the distance (between the two places), then he reduces it to the measure of the circumference of the circle. However, if we invert the calculation and reduce the parts (or degrees) of the great circle to *yojanas* according to his method, we get the number 3200, *i.e.* 100 *yojanas* less then we have given on the authority of

Al-arkand (v. p. 312). The double of it, 6400, comes near the number mentioned by Ibn Ṭâriḳ (*i.e.* 6596$\frac{9}{25}$, v. p. 312), being only about 200 *yojanas* smaller.

We shall now give the latitudes of some places, as we hold them to be correct.

A criticism of Âryabhaṭa of Kusumapura on the meridian of Ujain.

All canons of the Hindus agree in this that the line connecting Laṅkâ with Meru divides the οἰκουμένη lengthways in two halves, and that it passes through the city of Ujain, the fortress of Rohitaka, the river Yamunâ, the plain of Tâneshar, and the Cold Mountains. The longitudes of the places are measured by their distance from this line. On this head I know of no difference between them except the following passage in the book of Âryabhaṭa of Kusumapura:—

"People say that Kurukshetra, *i.e.* the plain of Tâneshar, lies on the line which connects Laṅkâ with Meru and passes through Ujain. So they report on the authority of Pulisa. But he was much too intelligent not to have known the subject better. The times of the eclipses prove that statement to be erroneous, and Pṛithusvâmin maintains that the difference between the longitudes of Kurukshetra and Ujain is 120 *yojanas*."

These are the words of Âryabhaṭa.

On the latitude of Ujain.

Ya'ḳûb Ibn Ṭâriḳ says in his book entitled *The Composition of the Spheres*, that the latitude of Ujain is 4$\frac{3}{5}$ degrees, but he does not say whether it lies in the north or the south. Besides, he states it, on the authority of the book *Al-Arkand*, to be 4$\frac{2}{5}$ degrees. We, however, have found a totally different latitude of Ujain in the same book in a calculation relating to the distance between Ujain and Almanṣûra, which the author calls Brahmaṇavâṭa, *i.e.* Bamhanwâ, viz. latitude of Ujain, 22° 29′; latitude of Almanṣûra, 24° 1′.

According to the same book, the straight shadow in Lohâniyye, *i.e.* Loharânî, is 5$\frac{3}{5}$ digits.

On the other hand, however, all the canons of the Hindus agree in this, that the latitude of Ujain is 24 degrees, and that the sun culminates over it at the time of the summer solstice.

Balabhadra, the commentator, gives as the latitude of Kanoj 26° 35′; as that of Tâneshar, 30° 12′. Page 163.

The learned Abû-Aḥmad, the son of Catlaghtagîn, calculated the latitude of the city of Karlî (?), and found it to be 28° 0′, that of Tâneshar 27′, and both places to be distant from each other by three days' marches. What the cause of this difference is I do not know.

According to the book *Karaṇa-sâra*, the latitude of Kashmîr is 34° 9′, and the straight shadow there $8\frac{7}{60}$ digits.

I myself have found the latitude of the fortress Lauhûr to be 34° 10′. The distance from Lauhûr to the capital of Kashmîr is 56 miles, half the way being rugged country, the other half plain. What other latitudes I have been able to observe myself, I shall enumerate in this place:—

Ghazna	33° 35′	Lamghân	34° 43′
Kâbul	33° 47′	Purshâvar	34° 44′
Kandî, the guard-station of the prince	33° 55′	Waihand	34° 30′
Dunpûr	34° 20′	Jailam	33° 20′
		The fortress Nandna	32° 0′

The distance between the latter place and Multân is nearly 200 miles.

Sâlkot	32° 58′
Mandakkakor	31° 50′
Multân	29° 40′

If the latitudes of places are known, and the distances between them have been measured, the difference between their longitudes also may be found according to the methods explained in the books to which we have referred the reader.

We ourselves have (in our travels) in their country not passed beyond the places which we have mentioned, nor have we learned any more longitudes and latitudes (of places in India) from their literature. It is God alone who helps us to reach our objects!

CHAPTER XXXII.

ON THE NOTIONS OF DURATION AND TIME IN GENERAL, AND ON THE CREATION OF THE WORLD AND ITS DESTRUCTION.

On the notion of time according to Alrâzî and other philosophers.

According to the relation of Muḥammad Ibn Zakariyyâ Alrâzî, the most ancient philosophers of the Greeks thought that the following five things existed from all eternity, *the creator, the universal soul. the first ὕλη, space in the abstract*, and *time in the abstract.* On these things Alrâzî has founded that theory of his, which is at the bottom of his whole philosophy. Further, he distinguishes between *time* and *duration* in so far as *number* applies to the former, not to the latter; for a thing which can be numbered is finite, whilst duration is infinite. Similarly, philosophers have explained *time* as duration with a beginning and an end, and *eternity* as duration without beginning and end.

According to Alrâzî, those five things are *necessary postulates* of the actually existing world. For that which the senses perceive in it is the ὕλη acquiring shape by means of combination. Besides, the ὕλη occupies some place, and therefore we must admit the existence of *space.* The changes apparent in the world of sense compel us to assume the existence of time, for some of them are earlier, others later, and the *before* and the *afterwards,* the earlier and the later, and the simultaneous can only be perceived by means of the notion of time, which is a necessary postulate of the existing world.

Further, there are *living beings* in the existing world. Therefore we must assume the existence of *the soul*. Among these living beings there are *intelligent* ones, capable of carrying the arts to the highest perfection; and this compels us to assume the existence of a Creator, who is wise and intelligent, who establishes and arranges everything in the best possible manner, and inspires people with the force of intelligence for the purpose of liberation.

On the other hand, some sophists consider eternity and time as one and the same thing, and declare the motion which serves to measure time alone to be finite.

Another one declares eternity to be the circular motion. No doubt this motion is indissolubly connected with that being which *moves* by it, and which is of the most sublime nature, since it lasts for ever. Thereupon he rises in his argumentation from the moving being to its mover, and from the moving mover to the first mover who is motionless.

This kind of research is very subtle and obscure. But for this, the opinions would not differ to such an extent that some people declare that there is no time at all, while others declare that time is an independent substance. According to Alexander of Aphrodisias, Aristotle gives in his book *φυσικὴ ἀκρόασις* the following argumentation: "Everything moving is moved by a mover;" and Galenus says on the same subject that he could not understand the notion of time, much less prove it.

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The notions of Hindu philosophers on time.

The theory of the Hindus on this subject is rather poor in thought and very little developed. Varâhamihira says in the opening of his book *Saṁhitâ*, when speaking of that which existed from all eternity: "It has been said in the ancient books that the first primeval thing was darkness, which is not identical with the black colour, but a kind of non-existence like the state of a sleeping person. Then God created this world for Brahman as a cupola for him. He made it to consist of two parts, a higher and a lower one, and placed the sun and moon in it." Kapila declares: "God has always existed, and with him the world, with all its substances and bodies. He, however, is a cause to the world, and rises by the subtlety of his nature above the gross nature of the world." Kumbhaka says: "The primeval one is *Mahâbhûta, i.e.* the compound of the five elements. Some declare that the primeval thing is *time*, others *nature*, and still others maintain that the director is *karman, i.e.* action."

In the book *Vishṇu-Dharma*, Vajra speaks to Mârkaṇḍeya: "Explain to me the times;" whereupon the latter answers: "Duration is *âtmapurusha*," *i.e. a breath*, and *purusha*, which means *the lord of the universe.* Thereupon, he commenced explaining to him the divisions of time and their dominants, just as we have propounded these things in detail in the proper chapters (chap. xxxiii. *et seq.*)

The Hindus have divided duration into two periods, a period of *motion*, which has been determined as *time*, and a period of *rest*, which can be determined only in an imaginary way according to the analogy of that which has first been determined, the period of motion. The Hindus hold the eternity of the Creator to be *determinable*, not *measurable*, since it is infinite. We, however, cannot refrain from remarking that it is extremely difficult to imagine a thing which is *determinable* but not *measurable*, and that the whole idea is very far-fetched. We shall here communicate so much as will suffice for the reader of the opinions of the Hindus on this subject, as far as we know them.

The common notion of the Hindus regarding creation is a popular one, for, as we have already mentioned, they believe matter to be eternal. Therefore, they do

The Day of Brahman a period of creation, the Night of

Brahman a period of non-creation.

not, by the word *creation*, understand *a formation of something out of nothing.* They mean by creation only the working with a piece of clay, working out various combinations and figures in it, and making such arrangements with it as will lead to certain ends and aims which are potentially in it. For this reason they attribute the creation to angels and demons, nay, even to human beings, who create either because they carry out some legal obligation which afterwards proves beneficial for the creation, or because they intend to allay their passions after having become envious and ambitious. So, for instance, they relate that Viśvâmitra, the Ṛishi, created the buffaloes for this purpose, that mankind should enjoy all the good and useful things which they afford. All this reminds one of the words of Plato in the book *Timæus:* "The *θεοί, i.e.* the gods, who, according to an order of their father, carried out the creation of man, took an immortal soul and made it the beginning; thereupon they fashioned like a turner a mortal body upon it."

Here in this context we meet with a duration of time which Muslim authors, following the example of the Hindus, call *the years of the world.* People think that at their beginnings and endings creation and destruction take place as kinds of new formations. This, however, is not the belief of the people at large. According to them, this duration is a day of Brahman and a consecutive night of Brahman; for Brahman is intrusted with creating. Further, the coming into existence is a motion in that which grows out of something different from itself, and the most apparent of the causes of this motion are the meteoric motors, *i.e.* the stars. These, however, will never exercise regular influences on the world below them unless they move and change their shapes in every direction (= their *aspects*). Therefore the coming into existence is limited to the *day of Brahman,* because in it only, as the

Hindus believe, the stars are moving and their spheres revolving according to their pre-established order, and in consequence the process of coming into existence is developed on the surface of the earth without any interruption. Page 165.

On the contrary, during *the night of Brahman* the spheres rest from their motions, and all the stars, as well as their apsides and nodes, stand still in one particular place.

In consequence all the affairs of the earth are in one and the same unchanging condition, therefore the coming into existence has ceased, because he who makes things come into existence rests. So both the processes of acting and of being acted upon are suspended; the elements rest from entering into new metamorphoses and combinations, as they rest now in (*lacuna; perhaps:* the night), and they prepare themselves to belong to new beings, which will come into existence on the following day of Brahman.

In this way existence circulates during *the life of Brahman*, a subject which we shall propound in its proper place.

Critical remark of the author.

According to these notions of the Hindus, creation and destruction only refer to the surface of the earth. By such a creation, not one piece of clay comes into existence which did not exist before, and by such a destruction not one piece of clay which exists ceases to exist. It is quite impossible that the Hindus should have the notion of a creation as long as they believe that *matter* existed from all eternity.

Brahman's waking and sleeping.

The Hindus represent to their common people the two *durations* here mentioned, the day of Brahman and the night of Brahman, as his *waking* and *sleeping;* and we do not disapprove of these terms, as they denote something which has a beginning and end. Further, the whole of *the life of Brahman*, consisting of a succession of motion and rest in the world during such a period, is considered as applying only to existence, not to non-existence, since during it the piece of clay exists and, besides, also its shape. The *life of Brahman* is only a *day* for that being who is above him, *i.e.* Purusha (*cf.* chap. xxxv.). When he dies all compounds are dissolved during his *night*, and in consequence of the annihilation of the compounds, that also is suspended which kept him (Brahman) within the laws of nature. This, then, is the rest of Purusha, and of all that is under his control (*lit.* and of his vehicles).

Vulgar and scientific notions on the sleep of Brahman.

When common people describe these things, they make the night of Brahman follow after the night of Purusha; and as Purusha is the name for a man, they attribute to him sleeping and waking. They derive destruction from his snoring, in consequence of which all things that hang together break asunder, and everything standing is drowned in the sweat of his forehead. And more of the like they produce, things which the mind declines to accept and the ear refuses to hear.

Therefore the educated Hindus do not share these opinions (regarding the waking and sleeping of Brahman), for they know the real nature of sleep. They know that the body, a compound of antipathetic *humores*, requires sleep for the purpose of resting, and for this purpose that all which nature requires, after being wasted, should be duly replaced. So, in consequence of the constant dissolution, the body requires food in order to replace that which had been lost by emaciation. Further, it requires cohabitation for the purpose of perpetuating the species by the body, as without cohabitation the species would die out. Besides, the body requires other things, evil ones, but necessary, while simple substances can dispense with them, as also He can who is above them, like to whom there is nothing.

Notions regarding the end of the world.

Further, the Hindus maintain that the world will perish in consequence of the conjunction of the twelve suns, which appear one after the other in the different months, ruining the earth by burning and calcining it, and by withering and drying up all moist substances. Further, the world perishes in consequence of the union of the four rains which now come down in the different seasons of the year; that which has been calcined attracts the water and is thereby dissolved. Lastly, the world perishes by the cessation of light and by the prevalence of darkness and non-existence. By all this the world will be dissolved into atoms and be scattered.

The *Matsya-Purâṇa* says that the fire which burns the world has come out of the water; that until then it dwelt on Mount Mahisha in the Kusha-Dvîpa, and was called by the name of this mountain.

The *Vishṇu-Purâṇa* says that "Maharloka lies above the pole, and that the duration of the stay there is one *kalpa*. When the three worlds burn, the fire and smoke injure the inhabitants, and then they rise and emigrate to Janaloka, the dwelling-place of the sons of Brahman, who preceded creation, viz. Sanaka, Sananda, Sanandanâda (?), Asuras, Kapila, Voḍhu, and Pañća-śikha."

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Abû-Ma'shar uses Indian theories.

The context of these passages makes it clear that this destruction of the world takes place at the end of a *kalpa*, and hence is derived the theory of Abû-Maʿshar that a deluge takes place at the conjunction of the planets, because, in fact, they stand in conjunction at the end of each *caturyuga* and at the beginning of each *kaliyuga*. If this conjunction is not a complete one, the deluge, too, will evidently not attain the highest degree of its destructive power. The farther we advance in the investigation of these subjects, the more light will be shed on all ideas of this kind, and the better the reader will understand all words and terms occurring in this context.

Buddhist notions from Alêrânshahrî.

Alêrânshahrî records a tradition, as representing the belief of the Buddhists, which much resembles the silly tales just mentioned. On the sides of Mount Meru there are four worlds, which are alternately civilised or desert. A world becomes desert when it is overpowered by the fire, in consequence of the rising of seven suns, one after the other, over it, when the water of the fountains dries up, and the burning fire becomes so strong as to penetrate into the world. A world becomes civilised when the fire leaves it and migrates to another world; after it has left, a strong wind rises in the world, drives the clouds, and makes them rain, so that the world becomes like an ocean. Out of its foam shells are produced, with which the souls are connected, and out of these human beings originate when the water has sunk into the ground. Some Buddhists think that a man comes by accident from the perishing world to the growing world. Since he feels unhappy on account of his being alone, out of his thought there arises a spouse, and from this couple generation commences.

CHAPTER XXXIII.

ON THE VARIOUS KINDS OF THE DAY OR NYCHTHEMERON, AND ON DAY AND NIGHT IN PARTICULAR.

Definition of day and night.

ACCORDING to the general usage of Muslims, Hindus, and others, a *day* or nychthemeron means the duration of one revolution of the sun in a rotation of the universe, in which he starts from the one half of a *great circle* and returns to the same. Apparently it is divided into two halves: the *day* (*i.e.* the time of the sun's being visible to the inhabitants of a certain place on earth), and the *night* (*i.e.* the time of his being invisible to them.) His being visible and being invisible are relative facts, which differ as the horizons differ. It is well known that the horizon of the equator, which the Hindus call *the country without latitude*, cuts the circles parallel to the meridian in two halves. In consequence, day and night are always equal there. However, the horizons which cut the parallel circles without passing through their pole divide them into two unequal halves, the more so the smaller the parallel circles are. In consequence, there day and night are unequal, except at the times of the two equinoxes, when on the whole earth, except Merû and Vaḍavâmukha, day and night are equal. Then all the places north and south of the line share in this peculiarity of the line, but only at this time, not at any other.

Manushyâhorâtra.

The beginning of the day is the sun's rising above the horizon, the beginning of the night his disappearing below it. The Hindus consider the day as the first, the

Page 167. night as the second, part of the nychthemeron. Therefore they call the former *Sâvana*, *i.e.* a day depending on the rising of the sun. Besides, they call it *Manushyâhorâtra*, *i.e.* a human day, because, in fact, the great mass of their people do not know any other kind of day but this. Now, assuming the *Sâvana* to be known to the reader, we shall in the following use it as a standard and gauge, in order thereby to determine all the other kinds of days.

Day of the fathers.

After *the human day* follows *Pitṛîṇâm ahorâtra*, *i.e.* the nychthemeron of the forefathers, whose spirits, according to the belief of the Hindus, dwell in the sphere of the moon. Its day and night depend upon light and darkness, not upon the rising and setting in relation to a certain horizon. When the moon stands in the highest parts of the sphere with reference to them, this is a day to them; and when it stands in the lowest parts, it is night to them. Evidently their moon is the time of *conjunction* or full moon, and their midnight is *opposition* or new moon. Therefore the nychthemeron of the forefathers is a compete lunar month, the day beginning at the time of half-moon, when the light on the moon's body begins to increase, and the night beginning at the time of half-moon, when her light begins to wane. This follows of necessity from the just-mentioned determination of the noon and midnight of the nychthemeron of the forefathers. Besides, it may be brought near to the reader by a comparison, as the bright half of the light on the moon's body may be compared to the rising of half of the globe of the sun over the horizon, and the other half's setting below the horizon. The day of this nychthemeron extends from the last quarter of a month to the first quarter of the succeeding month; the night from the first to the second quarter of one identical month. The totality of these two halves is the nychthemeron of the forefathers.

Thus the subject is explained by the author of *Vishṇu-Dharma* both at large and in detail, but afterwards he treats it a second time with very little understanding, and identifies *the day of the forefathers* with the *black* half of the month from opposition to conjunction, and their night with its *white* half, whilst the correct statement is that which we have just mentioned. This view is also confirmed by their custom of offering gifts of food to the forefathers on the day of conjunction, for they explain noon to be the time of taking food. For this reason they offer food to the forefathers at the same time when they themselves take it.

Day of the Devas.

Next follows the *Divyâhorâtra*, *i.e.* the nychthemeron of the angels. It is known that the horizon of the greatest latitude, *i.e.* that of 90 degrees, where the pole stands in the zenith, is the equator, not exactly, but approximately, because it is a little below the visible horizon for that place on earth which is occupied by Mount Meru; for its top and slopes the horizon in question and the equator may be absolutely identical, although the visible horizon lies a little below it (*i.e.* farther south). Further, it is evident that the zodiac is divided into two halves by being intersected by the equator, the one half lying above the equator (*i.e.* north of it), the second half below it. As long as the sun marches in the signs of northern declination it revolves like a mill, since the diurnal arcs which he describes are parallel to the horizon, as in the case of the sun-dials. For those who live under the north pole the sun appears above the horizon, therefore they have day, whilst for those living under the south pole the sun is concealed below the horizon, and therefore they have night. When, then, the sun migrates to the southern Page 168. signs, he revolves like a mill below the horizon (*i.e.* south of the equator); hence it is night to the people living under the north pole and day to those living under the south pole.

The dwellings of the *Devaka*, *i.e.* the spiritual beings, are under the two poles; therefore this kind of day is called by their name, *i.e.* the nychthemeron *of the Deva*.

Âryabhaṭa of Kusumapura says that the Deva see one half of the solar year, the Dânava the other; that the Pitáras see one half of the lunar month, human beings the other. So one revolution of the sun in the zodiac affords day and night both to the Deva and Dânava, and their totality is a nychthemeron.

In consequence our year is identical with the nychthemeron of the Deva. In it, however, day and night are not equal (as in the nychthemeron of the forefathers), because the sun moves slowly in the half of the northern declination about its apogee, by which the day becomes a little longer. However, this difference is not equal to the difference between the visible horizon and the real one, for this cannot be observed on the globe of the sun. Besides, according to Hindu notions, the inhabitants of those places are raised above the surface of the earth, dwelling on Mount Meru. Whoever holds this view holds regarding the height of Meru the same opinions as those we have described in the proper place (in chap. xxiii.) In consequence of this height of Mount Meru, its horizon must fall a little lower (*i.e.* more southward than the equator), and in consequence the rate of the day's being longer than the night is lessened (as then the sun does not entirely reach his northern apogee, where he makes the longest days). If this were anything else but simply a religious tradition of the Hindus, besides being one regarding which even they do not agree among themselves, we should try to find, by astronomical calculation, the amount of this depression of the horizon of Mount Meru below the equator, but as there is no use in this subject (Mount Meru being simply an invention), we drop it.

Some uneducated Hindu heard people speak of the day of such a nychthemeron in the north, and of its night in the south. In connection with these elements he determined the two parts of the year by the two halves of the zodiac, the one which ascends from the winter solstice, called the northern, and the one which descends from the summer solstice, called the southern. Then he identified the day of this nychthemeron with the ascending half, and its night with the descending half. All of which he has eternised in his books.

Not much better is what the author of the *Vishṇu-Dharma* says:—"The half beginning with Capricornus is the day of the *Asura*, *i.e.* the Dânavas, and their night begins with the sign of Cancer." Previously he had said: "The half beginning with Aries is the day of the Deva." This author acted without any understanding of the subject, for he simply confounds the two poles with each other (for according to this theory the half of the sun's revolution, beginning with Capricornus or the winter solstice, would be the day of the beings under the north pole or the Devas, not that of the beings under the south pole or Asuras, and the revolution of the sun beginning with Cancer or the summer solstice would be the day of the Asuras, not their night). If this author had really understood the sentence, and had known astronomy, he would have come to other conclusions.

Day of Brahman.

Next follows the *Brahmâhorâtra*, *i.e.* the nychthemeron of Brahman. It is not derived from light and darkness (as that of the forefathers), nor from the appearing or disappearing of a heavenly body (like that of the Devas), but from the physical nature of created things, in consequence of which they *move* in the day and *rest* in the night. The length of the nychthemeron of Brahman is 8,640,000,000 of our years. During one half of it, *i.e.* during the day, the æther, with all that is in it, is moving, the earth is producing, and the changes of existence and destruction are constantly going on upon the surface of the earth. During the other half, *i.e.* the night, there occurs the opposite of everything which occurs in the day; the earth is not changing, because those things which produce the changes are resting and all motions are stopped, as nature rests in the night and in the winter, and concentrates itself, preparing for a new existence in the day and in the summer.

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Each day of Brahman is a *kalpa*, as also each night, and a *kalpa* is that space of time which Muslim authors call *the year of the Sindhind.*

Day of Purusha.

Lastly follows the *Purushâhorâtra*, *i.e.* the nychthemeron of the All-soul, which is also called *Mahâkalpa*, *i.e.* the greatest *kalpa*. The Hindus only use it for the purpose of determining duration in general by something like a notion of time, but do not specify it as day and night. I almost feel inclined to think that the day of this nychthemeron means the duration of the soul's being connected with the ὕλη, whilst the night means the duration of their being separated from each other, and of the resting of the souls (from the fatigue of being mixed up with the ὕλη), and that that condition which necessitates the soul's being connected with the ὕλη or its being separated from the ὕλη reaches its periodical end at the end of this nychthemeron. The *Vishṇu-Dharma* says: "The life of Brahman is the day of Purusha, and the night of Purusha has the same length."

The Hindus agree in assigning to the life of Brahman a hundred of *his* years. The number of *our* years which corresponds to *one* of his years betrays itself to be a multiplication of 360 with the number of our years, which correspond to one nychthemeron of his. We have already mentioned (p. 331) the length of the nychthemeron of Brahman. Now the length of *a year of Brahman* is 3,110,400,000,000 of our years (*i.e.*

360 × 8,640,000,000). A hundred years of the same kind, reckoned in *our* years, are represented by the same number increased by two ciphers, so that you get in the whole ten ciphers, viz. 311,040,000,000,000. This space of time is a *day* of Purusha; therefore his nychthemeron is double of it, viz. 622,080,000,000,000 of *our* years.

Parârdha-kalpa.

According to the *Pulisa-Siddhânta*, the life of Brahman is a day of Purusha. However, it has also been mentioned that a day of Purusha is a *parârdhakalpa*. Other Hindus say that *parârdhakalpa* is the *day of kha*, *i.e.* the point, by which they mean the *first cause*, on which all existence depends. The *kalpa* occupies the eighteenth place in the scale of the degrees of the numbers (see p. 175). It is called *parârdha*, which means *the half of heaven*. Now, the double of this would be the *whole* of heaven and the whole nychthemeron. Therefore *kha* is represented by the number 864, followed by twenty-four ciphers, this number representing *our* years (*cf.* p. 331).

These terms must, on the whole, be rather considered as a philosophical means of conveying an abstract notion of time than as mathematical values composed of the various kinds of numbers, for they are derived from the processes of combination and dissolution, of procreation and destruction.

CHAPTER XXXIV.

ON THE DIVISION OF THE NYCHTHEMERON INTO MINOR PARTICLES OF TIME.

Ghaṭî.

THE Hindus are foolishly painstaking in inventing the most minute particles of time, but their efforts have not resulted in a universally adopted and uniform system. On the contrary, you hardly ever meet with two books or two men representing the subject identically. In the first instance, the nychthemeron is divided into sixty minutes or *ghaṭî*. We read in the book *Srûdhava* by Utpala the Kashmîrian: "If you bore in a piece of wood a cylindrical hole of twelve fingers' diameter and six fingers' height, it contains three *manâ* water. If you bore in the bottom of this hole another hole as large as six plaited hairs of the hair of a young woman, not of an old one nor of a child, the three *manâ* of water will flow out through this hole in one *ghaṭî*."

Cashaka.

Each minute is divided into sixty seconds, called *cashaka* or *cakhaka*, and also *vighaṭikâ*.

Prâṇa.
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Each second is divided into six parts or *prâṇa, i.e.* breath. The above-mentioned book, *Srûdhava*, explains the *prâṇa* in the following manner: "It is the breath of a sleeping person who sleeps a normal sleep, and not like a man who is ill, who suffers from retention of the urine, who is hungry, or has eaten too much, whose mind is occupied with some sorrow or pain; for the breath of a sleeping person varies according to the conditions of his soul, which originate either from desire or fear, according to the conditions of his body, depending upon the emptiness or fulness of his stomach, and according to various accidents disturbing the kind of *humor* which is considered the most desirable."

It is all the same whether we determine the *prâṇa* according to this rule (one nychthemeron = 21,600 *prâṇa*), or if we divide each *ghaṭî* into 360 parts (60 × 360 = 21,600), or each degree of the sphere into sixty parts (360 × 60 = 21,600).

Vinâḍî. As far as this all Hindus agree with each other in the matter, though they use different terms. So, for instance, Brahmagupta calls the *cashaka* or seconds *vinâḍî*, likewise Âryabhaṭa of Kusumapura. Besides the latter calls the minutes *nâḍî*. Both, however, did not use particles of time smaller than the *prâṇa*, which correspond to the minutes of the sphere (60 × 360). For Pulisa says: "*The minutes of the sphere*, which are 21,600, resemble the normal breaths of man at the time of the equinoxes, and when man is in perfect health. During one breathing of man the sphere revolves as far as one minute."

Kshaṇa. Other people insert between minute and second a third measure, called *kshaṇa*, which is equal to one-fourth of a minute (or fifteen seconds). Each *kshaṇa* is divided into fifteen *kalâ*, each of which is equal to one-sixtieth of a minute, and this is the *cashaka*, only called by another name.

Nimesha, lava, truṭi. Among the lower orders of these fractions of time there occur three names which are always mentioned in the same sequence. The largest is the *nimesha*, *i.e.* the time during which the eye, in the normal state of things, is open between two consecutive looks. The *lava* is the mean, and the *truṭi* the smallest part of time, the latter word meaning the cracking of the forefinger against the inside of the thumb, which is with them a gesture expressive of astonishment or admiration. The relation between these three measures varies very much. According to many of the Hindus—

2 *truṭi* = 1 *lava*.
2 *lava* = 1 *nimesha*.

Further, they differ as to the relation between the *nimesha* and the next higher order of fractions of time, for according to some the latter (*kâshṭhâ*) contains fifteen, according to others thirty *nimesha*. Others, again, divide each of these three measures into eighths, so that—

8 *truṭi* = 1 *lava*.
8 *lava* = 1 *nimesha*.
8 *nimesha* = 1 *kâshṭhâ* (?).

The latter system is used in the book *Srâdhava*, and has also been adopted by *Ś M Y* (?), one of their learned astronomers. He makes this division still more subtle by adding a further measure, smaller than the *truṭi*, which is called *aṇu*, and eight of which are one *truṭi*.

Kâshṭhâ, kalâ.

The next higher orders, parts of time larger than the *nimesha*, are *kâshṭhâ* and *kalâ*. We have said already (p. 335) that with some Hindus *kalâ* is only another name for *cashaka*, and is considered as equal to thirty *kâshṭhâ*. Further—

1 *kâshṭhâ* = 15 *nimesha*.
1 *nimesha* = 2 *lava*.
1 *lava* = 2 *truṭi*.

Others reckon thus—

1 *kalâ* = $\frac{1}{15}$th minute of the nychthemeron = 30 *kâshṭhâ*.
1 *kâshṭhâ* = 30 *nimesha*.

And the further fractions such as those just mentioned.

Lastly, others reckon thus—

1 *cashaka* = 6 *nimesha*.
1 *nimesha* = 3 *lava*.

Here ends the tradition of Utpala.

According to the *Vâyu-Purâṇa*—

1 *muhûrta* = 30 *kalâ*.
1 *kalâ* = 30 *kâshṭhâ*.
1 *kâshṭhâ* = 15 *nimesha*.

The smaller fractions are disregarded by the *Vâyu-Purâṇa*.

We have no means of settling the question as to which Page 171.
of these systems is the most authentic one. Therefore it is the best for us to adhere to the theory of Utpala and *Ś M Y* (?), *i.e.* to divide all measures of time smaller than a *prâṇa* by eight—

1 *prâṇa* = 8 *nimesha*.
1 *nimesha* = 8 *lava*.
1 *lava* = 8 *truṭi*.
1 *truṭi* = 8 *aṇu*.

The whole system is represented in the following table:—

The names of the measures of time.	How many times the smaller one is contained in the larger one.	How many of it are contained in one day.
Ghaṭî, Nâḍî	60	60
Kshaṇa	4	240
Cashaka, Vinâḍî, Kalâ	15	3600
Prâṇa	6	21,600
Nimesha	8	172,800
Lava	8	1,382,400
Truṭi	8	11,059,200
Aṇu	8	88,473,600

The Hindus have also a popular kind of division of Prahara.
the nychthemeron into eight *prahara*, *i.e.* changes of the watch, and in some parts of their country they have clepsydræ regulated according to the *ghaṭî*, by which the times of the eight watches are determined. After a watch which lasts seven and a half *ghaṭî* has elapsed, they beat the drum and blow a winding shell

called *śaṅkha*, in Persian *spêd-muhra.* I have seen this in the town of *Purshûr*. Pious people have bequeathed for these clepsydræ, and for their administration, legacies and fixed incomes.

Muhûrta.

Further, the day is divided into thirty *muhûrta*, but this division is not free from a certain obscurity; for sometimes you think that the *muhûrtas* have always the same length, since they compare them either with the *ghaṭî*, and say that two *ghaṭî* are one *muhûrta*, or with the *watches*, and say that one *watch* is three and three-quarters *muhûrta*. Here the *muhûrtas* are treated as if they were *horæ æquinoctiales* (*i.e.* so and so many *equal* parts of the nychthemeron). However, the number of such hours of a day or of a night differs on every degree of latitude, and this makes us think that the length of a *muhûrta* during the day is different from its length during the *night* (for if four watches or fifteen *muhûrta* represent a day or a night, the *muhûrtas* cannot be of the same length in the day and in the night, except at the times of the equinoxes).

On the other hand, the way in which the Hindus count the dominants of the *muhûrtas* makes us more inclined to the opposite opinion, that, in fact, the *muhûrtas* are of different length, for in the case of day and night they simply attribute to each of them fifteen dominants. Here the *muhûrtas* are treated like the *horæ obliquæ temporales* (*i.e.* twelve equal parts of the day and twelve equal parts of the night, which differ as day and night differ).

The latter opinion is confirmed by a calculation of the Hindus which enables them to find the number of the *muhûrtas* (which have elapsed of the day) by means of the digits which the shadow of a person at the time measures. From the latter number you subtract the digits of the shadow of the person at noon, and the remaining number you look out in the middle column of the following diagram, which we have taken from some of their metrical compositions. The corresponding field of the upper or lower columns shows the number of *muhûrtas* which you wanted to find.

The *muhûrtas* which have elapsed *before* noon	1	2	3	4	5	6	7	
How many digits the shadow in question is larger than the noon-shadow . . .	96	60	12	6	5	3	2	0
The *muhûrtas* which have elapsed *after* noon	14	13	12	11	10	9	8	

Whether the length of a *muhûrta* is variable or invariable.
Page 172.

The commentator of the *Siddhânta*, Pulisa, comments on the latter opinion, and blames those who in general declare *one muhûrta* to be equal to *two ghaṭî*, saying that the number of the *ghaṭî* of the nychthemeron varies in the different parts of the year, whilst the number of its *muhûrtas* does not vary. But in another place he contradicts himself, where he reasons about the measure of the *muhûrta*. He fixes one *muhûrta* as equal to 720 *prâṇa* or *breaths*, one breath being composed of two things: the *apâna* or the inhaling, and the *prâṇa* or the exhaling of breath. Two other terms of the same meaning are *niḥśvâsa* and *avaśvâsa*. However, if one thing is mentioned, the other is tacitly included and understood; as, for instance, if you speak of *days*, you include the nights, meaning to express days *and* nights. Accordingly a *muhûrta* is 360 *apâna* and 360 *prâṇa*.

In the same manner, when speaking of the measure of a *ghaṭî*, he only mentions the one species of breath, connoting the other, for he explains it in general as equal to 360 breaths (instead of 180 *apâna* and 180 *prâṇa*).

If now the *muhûrta* is measured by *breaths*, it is dependent upon the *ghaṭî* and the *horæ æquinoctiales* as the gauges of its measure. But this is exactly the contrary of what Pulisa intends, for he argues against his opponents who maintain that a day has fifteen *muhûrtas* only, if he who counts them dwells on the equator or somewhere else, but at the time of the equinoxes. Pulisa observes that the *abhijit* coincides with noon and the beginning of the second half of the day; that, therefore, if the number of the *muhûrtas* of the day varied, the number of the *muhûrta* called *abhijit* and denoting noon would vary too (*i.e.* it would not always be called the eighth *muhûrta* of the day).

Vyâsa says that the birth of Yudhishṭhira took place *in the white half, at noon*, at the eighth *muhûrta*. If an opponent means to infer from this that it was the day of an equinox, we answer by referring him to the statement of Mârkaṇḍeya, viz. that the birth took place at full moon in the month Jyaishṭha, a time of the year which is far distant from an equinox.

Further, Vyâsa says that the birth of Yudhishṭhira took place *at the abhijit, when the youth of the night was gone*, at midnight, *at the eighth* (*muhûrta*) *of the black half*, in the month of Bhâdrapada. This date, too, is far distant from an equinox.

Story of Śiśupâla.

Vasishṭha relates that Vâsudeva killed Śiśupâla, the son of the daughter of Kaṁsa, at the *abhijit*. The Hindus tell the following story of Śiśupâla. He had been born with four hands, and one day his mother heard a voice from above saying, "When that person who will kill him touches him, his two superfluous hands will fall off. Thereupon they put the child to the bosom of each of those who were present, and when it came to be touched by Vâsudeva, the two hands fell off, as had been prophesied. Now the aunt spoke to him, "Assuredly you will one day kill my child;" whereupon Vâsudeva, who was still a child, answered, "I shall not do that except he deserve it for some crime committed intentionally, and I shall not call him to account until his misdeeds exceed *ten*."

Some time afterwards Yudhishṭhira was occupied with preparing a sacrifice to the fire in the presence of the most famous personages. He consulted Vyâsa as to the rank of the guests present and the honours due to the president of such an assembly, consisting in the presentation of water and roses in a cup, and Vyâsa advised him to make Vâsudeva the president. In this assembly also Śiśupâla, his cousin, was present, and now he began to rage, maintaining that he had a better claim to such an honour than Vâsudeva. He boasted much and went even so far as to abuse the parent of Vâsudeva. The latter called the present company to witness as to his bad behaviour, and let him do as he liked. However, when the affair lasted too long, and passed beyond the number of *ten* (*muhûrtas*), Vâsudeva took the cup and threw it at him, as people throw with the *cakra*, and cut off his head. This is the story of Śiśupâla.

Criticisms on Pulisa.

He who wants to prove the above-mentioned theory (like Pulisa, viz. that the *muhûrtas* are thirty equal parts of the nychthemeron), will not succeed unless he prove that the *abhijit* falls together with noon and with the middle of the eighth *muhûrta* (so that the day consists of twice seven and a half equal *muhûrtas*, and likewise the night). As long as he does not prove this, the *muhûrtas* differ in length as days and nights, though just in India only very little, and it is possible that in times distant from the equinoxes noon falls either at the beginning or at the end of the eighth *muhûrta*, or within it.

How little exact is the learning of the author (Pulisa) who meant to prove this, is evident from the fact that among his arguments he produces a tradition from Garga to this effect, that at the *abhijit* of the equator Page 173. there is no shadow; for, in the first instance, it is not true save at the two days of the equinoxes; and, secondly, if it were true, it would not have anything to do with the subject he tries to prove (as the question of the different length of day and night and their divisions does not refer to the equator, where day and night always equal each other, but only to southern or northern latitudes of the earth).

Dominants of the muhûrtas. We represent the dominants of the single *muhûrtas* in the following table:

The number of the Muhûrtas.	The dominants of the Muhûrtas in the day.	The dominants of the Muhûrtas in the night.
1	Śiva, *i.e.* Mahâdeva.	Rudra, *i.e.* Mahâdeva.
2.	Bhujaga, *i.e.* the snake.	Aja, *i.e.* the lord of all cloven-footed animals.
3.	Mitra.	Ahirbudhnya, the lord of Uttarabhadrapadâ.
4.	Pitṛi.	Pûshan, the lord of Revatî.
5.	Vasu.	Dasra, the lord of Aśvinî.
6.	Âpas, *i.e.* the water.	Antaka, *i.e.* the angel of death.
7.	Viśva.	Agni, *i.e.* the fire.
8.	Viriñcya, *i.e.* Brahman.	Dhâtṛi, *i.e.* Brahma the preserver.
9.	Keśvara (!), *i.e.* Mahâdeva.	Soma, the lord of Mṛgaśirsha.
10.	Indrâgnî.	Guru, *i.e.* Jupiter.
11.	Indra, the prince.	Hari, *i.e.* Nârâyaṇa.
12.	Niśâkara, *i.e.* the moon.	Ravi, *i.e.* the sun.
13.	Varuṇa, *i.e.* the lord of the clouds.	Yama, the angel of death.
14.	Aryaman.	Tvashṭṛi, the lord of Citrâ.
15.	Bhâgeya (?).	Anila, *i.e.* the wind.

On the hours in Hindu astrology.

Nobody in India uses *the hours* except the astrologers, for they speak of the *dominants of the hours*, and, in consequence, also of *dominants of the nychthemera*. The dominant of the nychthemeron is at the same time the dominant of the night, for they do not separately establish a dominant for the day, and the night is, in this connection, never mentioned. They arrange the order of the dominants according to the *horæ temporales.*

They call the hour *horá*, and this name seems to indicate that in reality they use the *horæ obliquæ temporales;* for the Hindus call the *media signorum* (the centres of the signs of the zodiac) *horá*, which we Muslims call *nîmbahr* (cf. chap. lxxx.) The reason is this, that in each day and each night always six signs rise above the horizon. If, therefore, the hour is called by the name of the centre of a sign, each day and each night has twelve hours, and in consequence the hours used in the theory of the dominants of the hours are *horæ obliquæ temporales*, as they are used in our country and are inscribed on the astrolabes on account of these dominants. Page 174.

This opinion is confirmed by the following sentence of Vijayanandin in the *Karaṇa-tilaka*, i.e. *the first of the canons.* After having explained the rule how to find the dominant of the year and of the month, he says: "To find the *horâdhipati*, add the signs which have risen since the morning to the degree of the horoscope, the whole being reckoned in minutes, and divide the sum by 900. The quotient you get count off from the dominant of the nychthemeron, counting the planetary spheres from above to below. The dominant of a day you arrive at, is at the same time the dominant of the hour." He ought to have said, "To the quotient you get add one, and count off the sum from the dominant of the nychthemeron." If he had said, "Reckon the equatorial degrees which have risen," &c., the calculation would have resulted in *horæ æquinoctiales*.

Names of the twenty four horâs.

The Hindus give certain names to the *horæ obliquæ*, which we have united in the following table. We think they are taken from the book *Śrûdhava*.

The number of the Horâs.	Names of the Horâs in the day.	Whether favourable or unlucky.	Their names in the night.	Whether favourable or unlucky.
1.	Raudra.	Unlucky.	Kâlarâtri.	Unlucky.
2.	Saumya.	Lucky.	Rodhinî.	Lucky.
3.	Karâla.	Unlucky.	Vairahma (?).	Lucky.
4.	Sattra.	Lucky.	Trâsanîya.	Unlucky.
5.	Vega.	Lucky.	Gûhanîya (?).	Lucky.
6.	Viśâla.	Lucky.	Mâyâ.	Unlucky.
7.	Mṛityusâra.	Unlucky.	Damarîya (?).	Lucky.
8.	Śubha.	Lucky.	Jîvaharaṇî.	Unlucky.
9.	Kroda.	Lucky.	Śoshinî.	Unlucky.
10.	Caṇḍâla.	Lucky.	Vṛishṇî.	Lucky.
11.	Kṛittikâ.	Lucky.	Dâharîya (?).	The most unlucky of all.
12.	Amṛita.	Lucky.	Cântima (?).	Lucky.

What time is under the influence of the serpent Kulika.

Page 175.

The book *Vishṇu-Dharma* mentions, among the *nâgas* or serpents, a serpent called *Nâga Kulika*. Certain portions of the hours of the planets stand under its influence. They are unlucky, and everything which is eaten during them hurts and is of no use for anything. Sick people who treat themselves with poisonous medicines do not recover, but die and perish. During these times no incantation is of any avail against the bite of a snake, for the incantation consists in the mention of the Garuḍa, and in those inauspicious times the stork himself cannot help in any way, much less the mention of his name.

These times are represented in the following table where the planetary hour is reckoned as consisting of 150 parts.

The Dominants of the Hours.	Sun.	Moon.	Mars.	Mercury.	Jupiter.	Venus.	Saturn.
Number of the 150 parts of the hour before the beginning of the time of Kulika . .	67	71	0	0	17	144	86
Number of the parts during which the influence of Kulika lasts .	16	8	37	2	2 1 2	6	64

CHAPTER XXXV.

ON THE DIFFERENT KINDS OF MONTHS AND YEARS.

Definition of the lunar month.

THE *natural* month is the period of the moon's synodical revolution. We call it physical because it develops in the same way as all natural phenomena, rising out of a certain beginning like non-existence, increasing by degrees, and growing, standing still when the climax is attained, then descending, waning away and decreasing, till at last they return to the non-existence whence they came. In the same manner the light develops on the body of the moon, since she appears after the moonless nights as a crescent, then as a young moon (after the third night), and as full moon, and thereafter returns through the same stages to the last night, which is like non-existence, at all events with reference to human senses. It is well known to everybody why the moon continues for some length of time in the moonless nights, but it is not equally known, not even to educated people, why she continues some time as full moon. They must learn how small the body of the moon is in comparison with that of the sun, that in consequence the enlightened portion by far exceeds the dark one, and that this is one of the causes why the moon must necessarily appear as full moon for some length of time.

Effects of moonlight.

That the moon has certain effects on moist substances, that they are apparently subject to her influences, that, for instance, increase and decrease in ebb and flow develop periodically and parallel with the moon's phases, all this is well known to the inhabitants of sea-shores and seafaring people. Likewise physicians are well aware that she affects the *humores* of sick people, and that the fever-days revolve parallel with the moon's course. Physical scholars know that the life of animals and plants depends upon the moon, and experimentalists know that she influences marrow and brain, eggs and the sediments of wine in casks and jugs, that she excites the minds of people who sleep in full moonlight, and that she affects (?) linen clothes which are exposed to it. Peasants know how the moon acts upon fields of cucumbers, melons, cotton, &c., and even make the times for the various kinds of sowing, planting, and grafting, and for the covering of the cattle depend upon the course of the moon. Lastly, astronomers know that meteorologic occurrences depend upon the various phases through which the moon passes in her revolutions. Page 176.

This is the month, and twelve of them are in technical language called *a lunar year*.

Solar month.

The natural year is the period of a revolution of the sun in the ecliptic. We call it the *natural*, because it comprehends all the stages in the process of generation which revolve through the four seasons of the year. In the course of it, the rays of the sun as passing through a window-glass and the shadows of the sun-dials reassume the same size, position, and direction in which, or from which, they commenced. This is the year, and is called *the solar one*, in antithesis to the *lunar* year. As the lunar month is the twelfth part of the lunar year, the twelfth part of the solar year is a solar month in theory, the calculation being based on the mean rotation of the sun. If, however, the calculation is based on his varying rotation, a solar month is the period of his staying in one sign of the zodiac.

These are the well-known two kinds of months and years.

On luni-solar calculation.

The Hindus call the conjunction *amâvâsyâ*, the opposition *pûrṇimâ*, and the two quarters ATVH (?). Some of them use the lunar year with lunar months and days, whilst others use the lunar year but solar months, beginning with 0 degree of each zodiacal sign. The sun's entering a sign is called *sankrânti*. This luni-solar calculation is, however, only an approximative one. If they constantly used it, they would soon feel induced to adopt the solar year itself and solar months. In using this mixed system they had only this advantage, that they could dispense with intercalation.

Beginning of the lunar month.

Those who use lunar months begin the month with conjunction or new moon, and this method is *the canonical* one, whilst the others begin it with the opposition or full moon. I have heard people say that Varâhamihira does the latter, but I have not yet been able to ascertain this from his books. The latter method is forbidden. Still it seems as if it were rather old, because the *Veda* says: " Men say the moon has become complete, and by her becoming complete also the month has become complete. Thus they speak because they do not know me nor the interpretation of me, for the Creator of the world commenced creating with the white half, not with the black half." But possibly these words are only a saying of men (not really a sentence taken from the *Veda*).

The month counted as two halves.

The numeration of the days of the month begins with the new moon and the first lunar day is called *BRBA*, and again enumeration begins with full moon (*i.e.* they count twice fifteen days, beginning with new moon and full moon). Each two days which are equidistant from new moon or full moon have the same name (or number). In them, light and darkness on the body of the moon are in corresponding phases of increasing and waning, and the hours of the rising of the moon in one day correspond to the hours of her setting in the other.

For the purpose of finding these times they use the following calculation:—

Multiply the elapsed lunar days of the month, if they are less than 15, or, in case they are more, the difference between them and 15, by the number of the *ghaṭîs* of the night in question. Add 2 to the product, and divide the sum by 15. Then the quotient represents the number of *ghaṭîs* and minor fractions of time between the first night, and *either* the setting of the moon in the night in question, one of the nights of *the white half*, or the rising of the moon in the night in question, one of the nights of *the black half*.

This calculation is based on the fact that the space of time between the first night and the rising or setting of the moon in some following night of the same lunation varies by two minutes (*ghaṭî*), and that the nights vary, lasting either a little longer or a little shorter than thirty minutes. If, therefore, you count thirty minutes for each nychthemeron, and you divide the product by half the number of the minutes, you get two minutes for each nychthemeron. As these two minutes, however, agree with the difference of the nights, they multiplied the number of nychthemera by the measure of the night, *i.e.* the number of its *ghaṭîs* (see above, ll. 6, 7), whilst it would have been more accurate to multiply by the half of the sum of the *ghaṭîs* of the night in question and of the first night of the lunation. It is useless to add the two minutes, Page 177. for they represent the moment when the crescent of the moon first becomes visible, but if this moment were adopted as the beginning of the month, the two minutes would be transferred to the conjunction.

Various kinds of months.

As months are composed of days, there are as many kinds of months as there are kinds of days. Each month has thirty days. We shall here use the *civil* day (*Sâvana*, v. chap. xxxiii.) as a standard.

In agreement with the Hindu calculation of the revolutions of sun and moon in a *kalpa*, a *lunar month* $= 29\frac{189005}{356222}$ nychthemera. You find this number by dividing the sum of the days of the *kalpa* by the number of its lunar months. The number of the lunar months of a *kalpa* represents the difference between the revolutions of sun and moon in it, viz. 53,433,300,000.

A month has 30 lunar days, for this number is canonical, as the number of 360 is canonical for the number of days of a year. The *solar month* has 30 solar days and $30\frac{1,362,987}{3,110,400}$ civil days.

The month of the fathers is equal to 30 of our months, and has $885\frac{163,410}{178,111}$ civil days.

The month of the angels is equal to 30 years, and has $10,957\frac{241}{320}$ civil days.

The month of Brahman is equal to 60 *kalpas*, and has 94,674,987,000,000 civil days.

The month of Purusha is equal to 2,160,000 *kalpas*, and has 3,408,299,532,000,000,000 civil days.

The month of Kha has

Various kinds of years.

9,467,498,700,000,000,000,000,000,000,000 civil days.

By multiplying each of these months by twelve, we get the number of days of the corresponding year.

The *lunar* year has $354\frac{65,364}{178,111}$ civil days.

The *solar* year has $365\frac{827}{3200}$ civil days.

The *year of the fathers* has 360 lunar months, or $10,631\frac{1699}{178,111}$ civil days.

The *year of the angels* has 360 of our years, or $131,493\frac{3}{80}$ civil days.

The *year of Brahman* has 720 *kalpas*, or 1,136,099,844,000,000 civil days.

The *year of Purusha* has 25,920,000 *kalpas*, or 40,899,594,384,000,000,000 civil days.

The *year of Kha* has

113,609,984,400,000,000,000,000,000,000,000 civil days.

The latter number is mentioned by the Hindus, although it is written in their books that there is no combination of numbers beyond the *day of Purusha*, for

The day of Purusha.

it is the first and the last, and is without a beginning in the past and without an end in the future. The other kinds of days, of which months and years (those of the fathers, the angels, and Brahman) are composed, refer to beings who stand *under* Purusha in the order of beings, and whose duration is defined by certain limits of time. The *day of Purusha* is simply an abstraction of the Hindu mind to denote that which is above the soul (*âtman*), for they make no distinction between *purusha* and *âtman* except in the order or sequence in which they enumerate them. They speak of Purusha in terms resembling those of the Ṣûfîs, viz. the *he* is not the first, and is not something else. It is quite possible in imagination to extend the idea of duration from the existing present moment towards both sides, *i.e.* towards the past which no longer exists, and towards the future which possibly will exist, and, to measure duration; and if some part of it admits of being determined by days, imagination also admits reduplications of it in the guise of months and years. In all this it is the intention of the Hindus that we should refer the years invented by them to certain periods of life, beginning with the coming into existence, and ending with destruction and death. However, God the Creator is sublime beyond either, and also the simple substances (air, fire, earth, water) do not know coming into existence nor destruction (in periodical returns). Therefore we stop with the day of Purusha, and do not think it necessary to use still larger periods of time. Page 178.

A tradition relating to the years of the Great Bear and the pole.

Things which do not rest on intrinsic necessity offer a wide field for difference of opinion and arbitrary systematising, so as easily to become the source of numerous theories. Some of them may be developed according to a certain order and rule, whilst others are devoid of such. In the latter class I reckon the following theory, but unfortunately I have forgotten from what source it has come to me: "33,000 human years are one year of the Great Bear; 36,000 human years are one year of Brahman, and 99,000 human years are one year of the pole." However, as regards the year of Brahman, we remember that Vâsudeva speaks to Arjuna on the battlefield between the two ranks: "The day of Brahman is two *kalpas;*" and in the *Brahmasiddhânta* there is a tradition from Vyâsa, the son of Parâśara, and from the book *Smṛiti*, that *kalpa* is a day of Devaka, *i.e.* Brahman, and also a night of his. In consequence the there-mentioned theory is evidently wrong (one year of Brahman being infinitely longer than 36,000 years). Further, 36,000 years are the period of one revolution of the fixed stars in the ecliptic, since they pass one degree in 100 years, and the Great Bear belongs to them. However, in their traditional literature the Hindus separate the Great Bear from the fixed stars, and attribute to it a distance from the earth which differs from the real distance, and therefore they describe it by qualities and conditions which in reality do not belong to it. If the author of that theory meant by the year of the Great Bear one revolution of it, we do not see why it should revolve so much more rapidly than the other fixed stars (for, in that case, the diameter of its course would be much larger than that of the others), nor why it should form an exception to the laws of nature (according to which all fixed stars revolve at the same distance from the earth and in the same time); and the pole has no revolution which might be considered as a year of it. From all this I conclude that the author of the theory was a man entirely devoid of scientific education, and one of the foremost in the series of fools who simply invented those years for the benefit of people who worship the Great Bear and the pole. He had to invent a vast number of years, for the more outrageous it was, the more impression it would make.

CHAPTER XXXVI.

ON THE FOUR MEASURES OF TIME CALLED MÂNA.

Mâna and *pramâna* mean *measure.* The four kinds of measures are mentioned by Ya'ḳûb Ibn Ṭâriḳ in his book *Compositio Sphærarum,* but he did not know them thoroughly, and, besides, the names are misspelled, if this is not the fault of the copyists.

They are—

Saura-mâna, i.e. the solar measure.

Sâvana-mâna, i.e. the measure depending upon *the rising* (*civil* measure).

Candra-mâna, i.e. the lunar measure.

Nakshatra-mâna, i.e. the lunar-station measure (*sidereal* measure).

There are days of all four kinds of measure, days of an individual nature, which, when compared with other days, show a certain difference of measure. However, the number 360 is common to all of them (360 days of each class being a year). The civil days are used as a gauge to determine thereby the other days.

Measurement of the four different kinds of years and days.

As regards the *saura-mâna,* it is known that the solar year has $365\frac{827}{3200}$ civil days. Dividing this sum by 360, or multiplying it by 10 seconds ($= \frac{1}{360}$ day), you get as the measure of the *solar* day $1\frac{5009}{384,000}$ civil day.

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According to the *Vishṇu-Dharma,* this is the time of the sun's passing his *bhukti.*

The *civil* day, based on the *sâvana-mâna,* is here used as the unit of a day, for the purpose of measuring thereby the other kinds of days.

The *lunar* day, based on the *candra-mâna*, is called *tithi*. Dividing the lunar year by 360 or the lunar month by 30, you get as the measure of the *lunar* day $\frac{5,015,051}{31,558,320}$ civil days (*wrong:* read $\frac{10,519,443}{10,688,880}$ civil day).

According to the *Vishṇu-Dharma*, this is the time during which the moon is visible when she is far distant from the sun.

Nakshatra-mâna is the period of the moon's passing through her twenty-seven stations, viz. $27\frac{11,259}{35,002}$ days. This number is the quotient which you get by dividing the days of a *kalpa* by the number of the revolutions of the moon in a *kalpa*. Dividing it by 27, you get as the time of the moon's passing one station $1\frac{417}{35,002}$ civil days. Multiplying the same number by 12, as we have done with the lunar month, we get $327\frac{15,051}{17,501}$ civil days as the time of the moon's passing twelve times through all her stations. Dividing the first number by 30, we get as the measure of the sidereal day $\frac{518,771}{570,030}$ civil days.

According to the *Vishṇu-Dharma*, the sidereal month has only twenty-seven days, whilst the months of the other measures have thirty days; and if a year is composed of these days, it has $327\frac{15,051}{17,501}$ days (see above). Evidently there is a fault in the text of *Vishṇu-Dharma*, as the month is reckoned too short.

What use is made of the *saura-mâna*, *candra-mâna*, and *sâvana-mâna*.

The *saura-mâna* is used in the computation of the years which compose the *kalpa* and the four *yugas* in the *caturyugas*, of the years of the nativities, of the equinoxes and solstices, of the sixth parts of the year or the seasons, and of the difference between day and night in a nychthemeron. All these things are computed in solar years, months, and days.

The *candra-mâna* is used in the computation of the eleven *karaṇa* (v. chap. lxxviii.), in the determination of the leap month, in the computation of the sum of days of the *ûnarâtra* (v. chap. li.), and of new moon and full moon for lunar and solar eclipses (v. chap. lix.)

In all these things the Hindus use lunar years, months, and days, which are called *tithi.*

The *sâvana-mâna* is used in the calculation of the *vâra, i.e.* the days of the week, of the *ahargaṇa, i.e.* the sum of the days of an era (v. chap. li.); in determining the days of marriage and fasting (v. chap. lxxv.); the *sûtaka, i.e.* the days of childbed (v. chap. lxix.); the days of the uncleanness of the houses and the vessels of the dead (v. chap. lxxii.); the *cikitsâ, i.e.* certain months and years in which Hindu medical science prescribes the taking certain medicines; further in determining the *prâyaścitta, i.e.* the days of the expiations which the Brahmans make obligatory for those who have committed some sin, times during which they are obliged to fast and to besmear themselves with butter and dung (v. chap. lxxi.) All these things are determined according to *sâvana-mâna.*

On the contrary, they do not determine anything by the *nakshatra-mâna,* since it is comprehended in the *candra-mâna.*

Every measure of time which any class of people may choose by general consent to call a day, may be considered as a *mâna.* Some such days have already been mentioned in a preceding chapter (v. chap. xxxiii.) However, the four *mânas par excellence* are those to the explanation of which we have limited the present chapter.

CHAPTER XXXVII.

ON THE PARTS OF THE MONTH AND THE YEAR.

Uttarâyaṇa and dakshinâyana. As the year is one revolution of the sun in the ecliptic, it is divided in the same way as the ecliptic. The latter is divided into two halves, depending upon the two solstitial points. Correspondingly the year is divided into two halves, each of which is called *ayana.*

Page 180. When the sun leaves the point of the winter solstice, he begins to move towards the north pole. Therefore this part of the year, which is nearly one half, is referred to the north and called *uttarâyaṇa, i.e.* the period of the sun's marching through six zodiacal signs beginning with *Caper.* In consequence, this half of the ecliptic is called *makarâdi,* i.e. *having Caper as beginning.*

When the sun leaves the point of the summer solstice he begins to move towards the south pole; therefore this second half is referred to the south and called *dakshinâyana, i.e.* the period of the sun's marching through six zodiacal signs beginning with *Cancer.* In consequence, this half of the ecliptic is called *karkâdi,* i.e. *having Cancer as beginning.*

Uneducated people use only these two divisions or year-halves, because the matter of the two solstices is clear to them from the observation of their senses.

Uttarakûla and dakshakûla. Further, the ecliptic is divided into two halves, according to its declination from the equator, and this division is a more scientific one, less known to the people at large than the former, because it rests on calculation and speculation. Each half is called *kûla.*

That which has northern declination is called *uttarakûla* or *meshâdi*, i.e. *having Aries as beginning;* that which has southern declination is called *dakshakûla* or *tulâdi*, i.e. *having Libra as beginning.*

The seasons.

Further, the ecliptic is by both these divisions divided into four parts, and the periods during which the sun traverses them are called the *seasons of the year*—spring, summer, autumn, and winter. Accordingly, the zodiacal signs are distributed over the seasons. However, the Hindus do not divide the year into four, but into six parts, and call these six parts *ṛitu.* Each *ṛitu* comprehends two solar months, *i.e.* the period of the sun's marching through two consecutive zodiacal signs. Their names and dominants are represented, according to the most widespread theory, in the following diagram.

I have been told that in the region of Somanâth people divide the year into three parts, each consisting of four months, the first being *varshakâla*, beginning with the month Âshâḍha; the second, *śîtakala*, *i.e.* the winter; and the third, *ushṇakâla*, *i.e.* the summer.

Uttarâyana, belonging to the Devas or Angels.	The Zodiacal Signs of the Ritu.	Capricornus and Amphora.	Pisces and Aries.	Taurus and Gemini.
	Their name.	S'iśira.	Vasanta or Kusumâkara.	Grishma or Nidâgha.
	Their dominants.	Nârada.	Agni the Fire.	Indra the Ruler.

Scorpio and Sagittarius.	Virgo and Libra.	Cancer and Leo.	The Zodiacal Signs of the Ṛitu.	Dakshinâyana, belonging to the Pitaras or Fathers.
Hemanta.	S'arad.	Varshakâla.	Their names.	
Vaishṇava.	Prajâpati.	Viśvedevâḥ.	Their dominants.	

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I am inclined to think that the Hindus divide the ecliptic by such an opening of the circle which divides the circumference of a circle into six parts, a measure which is equal to the radius, beginning with the two solstitial points, and that therefore they use sixth parts of the ecliptic. If this is really the case, we must not forget that we, too, sometimes divide the ecliptic, beginning with the two solstitial points, at other times beginning with the equinoctial points, and that we use the division of the ecliptic in twelfth parts side by side with that in fourth parts.

The dominants of the single halves of months.

The months are divided into halves from new moon to full moon, and from full moon to new moon. The *Vishṇu-Dharma* mentions the dominants of the halves of the months, as we give them in the following table:—

The Names of the months.	The dominants of the *Bright* half of each month.	The dominants of the *Black* half of each month.
Caitra,	Twashṭri,	Yâmya.
Vaiśâkha,	Indrâgnî,	Âgneya.
Jyaishṭha,	Śukra,	Raudra.
Âshâḍha,	Viśvedevâḥ,	Sârpa.
Śrâvaṇa,	Vishṇu,	Pitrya.
Bhâdrapada,	Aja,	Sânta.
Âśvayuja,	Âśana (?),	Maitra.
Kârttika,	Agni,	Śakra.
Mârgaśîrsha,	Saumya,	Nirṛiti.
Pausha,	Jîva,	Vishṇu.
Mâgha,	Pitrya,	Varuṇa.
Phâlguna,	Bhaga,	Pûshan.

CHAPTER XXXVIII.

ON THE VARIOUS MEASURES OF TIME COMPOSED OF DAYS, THE LIFE OF BRAHMAN INCLUDED.

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Recapitulation of the single measures of time.

THE day is called *dimas* (*dimasu*), in classical language *divasa*, the night *râtrî*, and the nychthemeron *ahorâtra*. The month is called *mâsa* and its half *paksha*. The first or *white* half is called *śuklapaksha*, because the first parts of its nights have moonlight at times when people do not yet sleep, when the light on the moon's body increases and the dark portion decreases. The other or *black* half is called *kṛishṇapaksha*, because the first parts of its nights are moonless, whilst other parts have moonlight, but only then when people sleep. They are the nights when the light on the body of the moon wanes, whilst the dark part increases.

The sum of two months is a *ṛitu*, but this is only an approximative definition, for the month which has two *paksha* is a lunar month, whilst that one the double of which is a *ṛitu* is a solar month.

Six *ṛitu* are a year of mankind, a solar year, which is called *barh* or *barkh* or *barsh*, the three sounds *h*, *kh*, and *sh* being much confounded in the mouth of the Hindus (Skr. *varsha*).

Three hundred and sixty years of mankind are one year of the angels, called *dibba-barh* (*divya-varsha*), and 12,000 years of the angels are unanimously reckoned as one *caturyuga*. There is a difference of opinion only regarding the four parts of the *caturyuga* and regarding the multiplications of it which form a *manvantara* and a *kalpa*. This subject will be fully explained in the proper place (v. chaps. xli. and xliv.)

Two *kalpas* are a day of Brahman. It is the same if we say two *kalpas* or 28 *manvantaras*, for 360 days of Brahman are a year of Brahman, *i.e.* 720 *kalpas* or 10,080 *manvantaras*.

Further, they say that the life of Brahman is 100 of his years, *i.e.* 72,000 *kalpas* or 1,008,000 *manvantaras*.

In the present book we do not go beyond this limit. The book *Vishṇu-Dharma* has a tradition from Mârkaṇḍeya, who answers a question of Vajra in these words: "*Kalpa* is the day of Brahman, and the same is a night of his. Therefore 720 *kalpas* are a year of his, and his life has 100 such years. These 100 years are one day of Purusha, and the same is a night of his. How many Brahmans, however, have already preceded Purusha, none knows but he who can count the sand of the Ganges or the drops of the rain."

CHAPTER XXXIX.

ON MEASURES OF TIME WHICH ARE LARGER THAN THE LIFE OF BRAHMAN.

Want of system regarding the greatest measures of time.

ALL that is devoid of order or contradicts the rules laid down in the preceding parts of this book is repulsive to our nature and disagreeable to our ear. But the Hindus are people who mention a number of names, all—as they maintain—referring to the One, the First, or to some one behind him who is only hinted at. When they come to a chapter like this, they repeat the same names as denoting a multitude of beings, measuring out lives for them and inventing huge numbers. The latter is all they want; they indulge in it most freely, and numbers are patient, standing as you place them. Besides, there is not a single subject on which the Hindus themselves agree among each other, and this prevents us on our part adopting the use of it. On the contrary, they disagree on these imaginary measures of time to the same extent as on the divisions of the day which are less than a *prâṇa* (v. chap. xxxiv.)

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The greatest measures of time determined by *kalpas*.

The book *Srûdhava* by Utpala says that "a *manvantara* is the life of Indra the ruler, and 28 *manvantaras* are one day of Pitâmaha, *i.e.* Brahman. His life is 100 years, or one day of Keśava. The life of the latter is 100 years, or one day of Mahâdeva. The life of the latter is 100 years, or one day of Îśvara, who is near to the Supreme Being. His life is 100 years, or one day of Sadâśiva. The life of the latter is 100 years, or one day of Virañcana, the Eternal, who will last for ever, even when the preceding five beings perish."

We have already mentioned that the life of Brahman is as long as 72,000 *kalpas*. All numbers which we shall here mention are *kalpas*.

If the life of Brahman is a day of Keśava, his year, consisting of three hundred and sixty days, has 25,920,000 *kalpas*, and his life, 2,592,000,000 *kalpas*. The latter is 1 day of Mahâdeva; his life, therefore, 93,312,000,000,000 *kalpas*. The latter is 1 day of Îśvara; therefore his life 3,359,232,000,000,000,000 *kalpas*. The latter is 1 day of Sadâśiva; therefore his life 120,932,352,000,000,000,000,000 *kalpas*. The latter is one day of Virañcana, of which the *parârdhakalpa* is only relatively a very small part (v. p. 175).

The same determined by *truṭis*.

Whatever may be the nature of these calculations, apparently the day and the *centennium* are the elements out of which the whole from beginning to end has been constructed. Others, however, build their system on the small particles of the day which we have previously mentioned (in chap. xxxiv.) In consequence, these people differ among themselves regarding that which they compose, as they differ regarding the particles out of which they compose. We shall here give one system of this kind as invented by those who use the following metrologic system:—

1 *ghaṭî* = 16 *kalâ*.
1 *kalâ* = 30 *kâshṭhâ*.
1 *kâshṭhâ* = 30 *nimesha*.
1 *nimesha* = 2 *lava*.
1 *lava* = 2 *truṭi*.

The reason of this division is, as they maintain, the fact that the day of Śiva is composed out of similar particles; for the life of Brahman is one *ghaṭî* of Hari, *i.e.* Vâsudeva. The life of the latter is 100 years, or one *kalâ* of Rudra, *i.e.* Mahâdeva; the life of the latter is 100 years, or one *kâshṭhâ* of Îśvara; the life of the latter is 100 years, or one *nimesha* of Sadâśiva; the life of the latter is 100 years, or one *lava* of Śakti; the life of the latter is 100 years, or one *truṭi* of Śiva.

If, now, the life of Brahman is
72,000 *kalpas*,
the life of Nârâyaṇa is
155,520,000,000 *kalpas* ;
the life of Rudra,
5,374,771,200,000,000,000 ;
the life of Îśvara,
5,572,562,780,160,000,000,000,000,000 ;
the life of Sadâśiva,
173,328,992,714,096,640,000,000,000,000,000,000,000 ;
the life of Śakti,
10,782,449,978,758,523,781,120,000,000,000,000,000,000,000,000,000.
The latter number represents one *truṭi*.

If you compose a day out of it according to the above-mentioned system, it has 37,264,147,126,589,453,187,550,720,000,000,000,000,000,000,000,000,000,000 *kalpas*. The latter number is one day of Śiva, whom they describe as the eternal one, who is exempt from being procreated and from procreating, free from all qualities and attributes which may be applied to created things. The last-mentioned number represents fifty-six orders of number (*i.e.* units, tens, hundreds, thousands, &c., &c.); but if those dreamers had more assiduously studied arithmetic, they would not have invented such outrageous numbers. God takes care that their trees do not grow into heaven.

CHAPTER XL.

ON THE SAṀDHI, THE INTERVAL BETWEEN TWO PERIODS OF TIME, FORMING THE CONNECTING LINK BETWEEN THEM.

Page 184. Explanation of the two *saṁdhis*.

THE original *saṁdhi* is the interval between day and night, *i.e.* morning-dawn, called *saṁdhi udaya, i.e.* the *saṁdhi* of the rising, and evening dawn, called *saṁdhi astamana, i.e.* the *saṁdhi* of the setting. The Hindus require them for a religious reason, for the Brahmans wash themselves during them, and also at noon in the midst between them for dinner, whence an uninitiated person might infer that there is still a third *saṁdhi*. However, none who knows the subject properly will count more than two *saṁdhis*.

The Purâṇas relate the following story of King Hiraṇyakaśipu, of the class of the Daitya :—

Story of King Hiraṇyakaśipu and his son Prahlâda.

By practising devotion for a long period, he had earned the claim that any prayer of his should be granted. He asked for *eternal* life, but only *long* life was granted to him, for eternity is a quality of the Creator alone. Not having obtained the realisation of this wish, he desired that his death should not be effected by the hand of a human being, angel, or demon, and that it should not take place on earth nor in heaven, neither in the night nor in the day. By such clauses he meant to avoid death, which is unavoidable by man. His wish was granted to him.

This wish reminds one of the wish of the devil that he should be allowed to live till the day of resurrection, because on that day all beings would rise from death. However, he did not attain his object, as it was only conceded to him to live till the day of the well-known time, of which it has been said that it is the last of the days of trouble.

The king had a son called Prahlâda, whom he intrusted to a teacher when he grew up. One day the king ordered him into his presence to learn what he was studying. Now the boy recited to him a poem, the meaning of which was that only Vishṇu exists, whilst everything else is illusion. This went much against the opinions of his father, who hated Vishṇu, and therefore he ordered the boy to be intrusted to another master, and that he should learn to distinguish a friend from an enemy. Thereupon he waited a certain time, and then examined him again, when the boy answered, "I have learned what you have ordered, but I do not want it, for I am in friendship alike with everything, not in enmity with anything." Now his father became angry and ordered him to be poisoned. The boy took the poison in the name of God and thought of Vishṇu, and lo! it did not hurt him. His father said, "Do you know witchcraft and incantations?" The boy answered, "No, but the God who has created me and given me to thee watches over me." Now the wrath of the king increased, and he gave orders to throw him into the deep sea. But the sea threw him out again, and he returned to his place. Then he was thrown before the king into a huge blazing fire, but it did not hurt him. Standing in the flame, he began to converse with his father on God and his power. When the boy by chance said that Vishṇu is in every place, his father said, "Is he also in this column of the portico?" The boy said, "Yes." Then his father jumped against the column and beat it, whereupon Narasiṁha came forth from it, a human figure with a lion's head, therefore neither a human being, nor an angel, nor a demon. Now the king and his people began to fight with Narasiṁha, who let them do so, for it was daytime. But when it was towards evening and they were in the *saṁdhi* or twilight, therefore neither in the day nor in the night, then Narasiṁha caught the king, raised him into the air, and killed him there; therefore not on earth nor in heaven. The prince was taken out of the fire and ruled in his place.

Saṁdhi used in astrology. Varâhamihira quoted.

Hindu astrologers require the two *saṁdhi*, because then some of the zodiacal signs exercise the most powerful influence, as we shall explain hereafter in the proper place. They make use of them in a rather superficial way, simply reckoning the time of each *saṁdhi* as one *muhûrta* = two *ghaṭî* = 48 minutes. However, Varâhamihira, excellent astronomer as he is, always only used day and night, and did not allow himself to follow the opinion of the crowd regarding the *saṁdhi*. He explained the *saṁdhi* as that which it really is, viz. as the moment when the centre of the body of the sun
Page 183. stands exactly over the horizontal circle, and this moment he establishes to be the time of the greatest power of certain zodiacal signs.

On the *saṁdhi* of the year-half and its combination with the precession of the equinoxes. Other kinds of *saṁdhi*.

Besides the two *saṁdhi* of the natural day, astronomers and other people assume still other *saṁdhis*, which do not rest on a law of nature nor on observation, but simply on some hypothesis. So they attribute a *saṁdhi* to each *ayana*, *i.e.* to each of the year-halves in which the sun ascends and descends (v. chap. xxxvii.), a *saṁdhi* of seven days before its real beginning. On this subject I have an idea which is certainly possible, and even rather likely, viz. that this theory is of recent origin, not of ancient date, and that it has been brought forward about 1300 of Alexander (= A.D. 989), when the Hindus found out that the real solstice precedes the solstice of their calculation. For Puñjala, the author of the *Small Mânasa*, says that in the year 854 of the Śakakâla the real solstice preceded his calculation by 6° 50′, and that this difference will increase in future by one minute every year.

These are the words of a man who either was himself a most careful practical observer, or who examined the observations of former astronomers which he had at his disposal, and thereby found out the amount of the annual difference. No doubt, also, other people have perceived the same or a similar difference by means of the calculation of the noon-shadows. Therefore (as this observation was already much known) Utpala of Kashmîr has taken this theory from Puñjala.

This conjecture of mine is confirmed by the fact that the Hindus prefix the *saṁdhis* of the solstices to each of the six seasons of the year, in consequence of which they begin already with the twenty-third degrees of the next preceding signs.

The Hindus assume a *saṁdhi*, too, between the different *yugas* and between the *manvantaras* ; but as the bases of this theory are hypothetical, so everything else derived from them is hypothetical. We shall give a sufficient explanation of these things in the proper place.

CHAPTER XLI.

DEFINITION OF THE TERMS "KALPA" AND "CATURYUGA," AND AN EXPLICATION OF THE ONE BY THE OTHER.

On the measure of a *caturyuga* and a *kalpa*.

TWELVE thousand Divya-years, the length of which has already been explained (v. chap. xxxv.), are one *caturyuga*, and 1000 *caturyugas* are one *kalpa*, a period at the beginning and end of which there is a conjunction of the seven planets and their apsides and nodes in 0° of Aries. The days of the *kalpa* are called the *kalpa-ahargaṇa*, for *âh* means *day*, and *argana* means *the sum*. Since they are *civil days* derived from the *rising* of the sun, they are also called *days of the earth*, for *rising* presupposes an horizon, and an horizon is one of the necessary attributes of the earth.

By the same name, *kalpa-ahargaṇa*, people also call the sum of days of any era up to a certain date.

Our Muslim authors call the days of the kalpa *the days of the Sind-hind* or *the days of the world*, counting them as 1,577,916,450,000 days (*sâvana* or civil days), or 4,320,000,000 solar years, or 4,452,775,000 lunar years. The same sum of days converted into years of 360 civil days is equal to 4,383,101,250 of them, and to 12,000,000 *divya-years*.

The Âditya-Purâṇa says, "*Kalpana* is composed of *kal*, which means the existence of the species in the world, and *pana*, which means their destruction and disappearance. The sum of this existing and perishing is a *kalpa*."

Brahmagupta says, "Since the planets and mankind in the world came into existence at the beginning of the day of Brahman, and since they both perish at the end of it, we must adopt this day of their existence as a *kalpa*, not another period."

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In another place he says: "A thousand *caturyuga* are one day of *Devaka*, *i.e.* Brahman, and a night of his is of the same length. Therefore his day is equal to 2000 *caturyugas*."

In the same way Vyâsa the son of Parâśara says: "He who believes that 1000 *caturyugas* are a day and 1000 *caturyugas* a night, knows Brahman."

Relation between *manvantara* and *kalpa*.

Within the space of a *kalpa* 71 *caturyugas* are equal to 1 *manu*, i.e. *manvantara*, or Manu-period, and 14 *manus* are equal to 1 *kalpa*. Multiplying 71 by 14, you get 994 *caturyugas* as the period of 14 *manvantaras*, and a remainder of 6 *caturyugas* till the end of the *kalpa*.

If we, however, divide these 6 *caturyugas* by 15, in order to find the *saṁdhi* both at the beginning and end of each of the 14 *manvantaras*, the number of the *saṁdhis* being by 1 larger than that of the *manvantaras*, the quotient is $\frac{2}{5}$ths. If we now insert $\frac{2}{5}$ *caturyuga* between each two consecutive *manvantaras*, and add the same amount both at the beginning of the first and the end of the last *manvantaras*, the fraction of $\frac{2}{5}$ disappears at the end of 15 *manvantaras* ($\frac{2}{5} \times 15 = 6$). The fractions at the beginning and end of the *kalpa* represent the *saṁdhi*, *i.e.* a common link. A *kalpa*, including its *saṁdhi*, has 1000 *caturyugas*, as we have said in the first part of this chapter.

Conditions of the beginning of a *kalpa*.

The single parts of a *kalpa* stand in a constant relation to each other, one bearing witness regarding the other. For it commences with the vernal equinox, a Sunday, the conjunction of the planets, their apsides and nodes, which takes place there where there is neither Revatî nor Aśvinî, *i.e.* between them, at the beginning of the month Caitra, and in the moment of the sun's rising over Laṅkâ. When there occurs an irregularity with one of these conditions, all the others become confused and are no longer valid.

We have already mentioned the number of the days and the years of a *kalpa*. Accordingly a *caturyuga*, as $\frac{1}{1000}$th of a *kalpa*, has 1,577,916,450 days and 4,320,000 years. The numbers show the relation between a *kalpa* and a *caturyuga*, and show further how to determine the one by the other.

All we have said in this chapter rests on the theory of Brahmagupta and on the arguments by which he supports it.

Theories of Âryabhaṭa the elder, Pulisa, and Âryabhaṭa the younger.

Âryabhaṭa the elder and Pulisa compose the *manvantara* from 72 *caturyugas*, and the *kalpa* from 14 *manvantaras*, without inserting anywhere a *saṁdhi*. Therefore, according to them, a *kalpa* has 1008 *caturyugas*; further, 12,096,000 *divya years*, or 4,354,560,000 human years.

According to Pulisa, a *caturyuga* has 1,577,917,800 *civil* days. According to him, therefore, the sum of the days of a *kalpa* would be 1,590,541,142,400. These are the numbers which he uses in his book.

I have not been able to find anything of the books of Âryabhaṭa. All I know of him I know through the quotations from him given by Brahmagupta. The latter says in a treatise called *Critical Research on the Basis of the Canons*, that according to Âryabhaṭa the sum of the days of a *caturyuga* is 1,577,917,500, *i.e.* 300 days less than according to Pulisa. Therefore Âryabhaṭa would give to a *kalpa* 1,590,540,840,000 days.

According to Âryabhaṭa and Pulisa, the *kalpa* and *caturyuga* begin with midnight which follows after the day the beginning of which is the beginning of the *kalpa*, according to Brahmagupta.

Âryabhaṭa of Kusumapura, who belongs to the school of the elder Âryabhaṭa, says in a small book of his on
Page 187. *Al-ntf* (?), that "1008 *caturyugas* are one day of Brah-

man. The first half of 504 *caturyugas* is called *utsarpiṇī*, during which the sun is ascending, and the second half is called *avasarpiṇī*, during which the sun is descending. The midst of this period is called *sama*, *i.e.* equality, for it is the midst of the day, and the two ends are called *durtama* (?)."

This is so far correct, as the comparison betwen day and *kalpa* goes, but the remark about the sun's ascending and descending is not correct. If he meant the sun who makes *our* day, it was his duty to explain of what kind that ascending and descending of the sun is; but if he meant a sun who specially belongs to the day of Brahman, it was his duty to show or to describe him to us. I almost think that the author meant by these two expressions the progressive, increasing development of things during the first half of this period, and the retrograde, decreasing development in the second half.

CHAPTER XLII.

ON THE DIVISION OF THE CATURYUGA INTO YUGAS, AND THE DIFFERENT OPINIONS REGARDING THE LATTER.

The single parts of a *caturyuga* according to *Vishṇu-Dharma* and Brahmagupta.

THE author of the *Vishṇu-Dharma* says: "Twelve hundred *divya years* are one *yuga*, called *tishya*. The double of it is a *dvâpara*, the triple a *tretâ*, the quadruple a *kṛita*, and all four *yugas* together are one *caturyuga*, *i.e.* the four *yugas* or *sums*.

"Seventy-one *caturyugas* are one *manvantara*, and 14 *manvantaras*, together with a *saṁdhi* of the duration of one *kṛitayuga* between each two of them, are one *kalpa*. Two *kalpas* are a nychthemeron of Brahman, and his life is a hundred years, or one day of Purusha, the first man, of whom neither beginning nor end is known."

This is what Varuṇa, the lord of the water, communicated to Râma, the son of Daśaratha, in primeval times, since he knew these things thoroughly. The same information has also been given by Bhârgava, *i.e.* Mârkaṇḍeya, who had such a perfect knowledge of time that he easily mastered every number. He is to the Hindus like the angel of death, who kills them with his seat, being *aprati-dhṛishya* (irresistible).

Brahmagupta says: "The book *Smṛiti* mentions that 4000 *devaka years* are one *kṛitayuga*, but together with a *saṁdhi* of 400 years and a *saṁdhyâṁśa* of 400 years, a *kṛitayuga* has 4800 *devaka years*.

"Three thousand years are one *tretâyuga*, but together with a *saṁdhi* and a *saṁdhyâṁśa*, each of 300 years, a *tretâyuga* has 3600 years.

"Two thousand years are a *dvâpara*, but together with a *saṁdhi* and a *saṁdhyâṁśa*, each of 200 years, a *dvâpara* has 2400 years.

"A thousand years are one *kali*, but together with a *saṁdhi* and a *saṁdhyâṁśa*, each of 100 years, a *kaliyuga* has 1200 years."

This is what Brahmagupta quotes from the book *Smṛiti*.

Duration of the single *yugas*.

"*Divya years* are changed into human years by being multiplied by 360. Accordingly the four *yugas* have the following sums of human years:—

A *kṛitayuga* has	1,440,000 years,	
besides	144,000 „	*saṁdhi*,
and	144,000 „	*saṁdhyâṁśa*.
Sum total	1,728,000 years = one *kṛitayuga*.	
A *tretâyuga* has	1,080,000 years,	
besides	108,000 „	*saṁdhi*,
and	108,000 „	*saṁdhyâṁśa*.
Sum total	1,296,000 years = one *tretâyuga*.	
A *dvâpara* has	720,000 years,	
besides	72,000 „	*saṁdhi*,
and	72,000 „	*saṁdhyâṁśa*.
Sum total	864,000 years = one *dvâpara*.	
A *kali* has	360,000 years,	
besides	36,000 „	*saṁdhi*,
and	36,000 „	*saṁdhyâṁśa*.
Sum total	432,000 years = one *kaliyuga*.	

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"The sum of the *kṛita* and *tretâ* is 3,024,000 years, and the sum of the *kṛita*, *tretâ*, and *dvâpara* is 3,888,000 years."

Âryabhaṭa and Pulisa quoted by Brahmagupta.

Further, Brahmagupta says that "Âryabhaṭa considers the four *yugas* as the four equal parts of a *caturyuga*. Thus he differs from the doctrine of the book *Smṛiti*, just mentioned, and he who differs from us is an opponent." On the other hand, Brahmagupta praises Paulisa for what he does, since he does not differ from the book *Smṛiti;* for he subtracts 1200 from the 4800 years of the *kṛitayuga*, and diminishes the remainder still more and more, so as to get *yugas* which correspond with those of the *Smṛiti*, but *yugas* without *saṁdhi* and *saṁdhyâṁśa*. As regards the Greeks, we may notice that they have nothing like the tradition of the *Smṛiti*, for they do not measure time by *yugas*, *manvantaras*, or *kalpas*.

So far the quotation from Brahmagupta.

As is well known, there is no difference of opinion on the sum of the years of a complete *caturyuga*. Therefore, according to Âryabhaṭa, the *kaliyuga* has 3000 *divya* years or 1,080,000 human years. Each two *yugas* has 6000 *divya* years or 2,160,000 human years. Each three *yugas* has 9000 *divya* years or 3,240,000 human years.

The rule of Paulisa.

There is a tradition that Paulisa in his *Siddhânta* specifies various new rules for the computation of these numbers, some of which may be accepted, whilst others are to be rejected. So in the rule for the computation of the *yugas* he puts 48 as the basis and subtracts one-fourth of it, so as to get 36. Then he again subtracts 12, for this number is his *basis* of subtraction, so as to get 24, and subtracting the same number a third time, he gets 12. These 12 he multiplies by 100, and the product represents the number of *divya* years of the *yugas*.

Criticism thereon.

If he had made the number 60 the basis, for most things may be determined by it, and had made one-fifth of it the basis of subtraction, or if he had subtracted from 60 consecutive fractions of the remaining number, first $\frac{1}{5} = 12$, from the remainder $\frac{1}{4} = 12$, from the remainder $\frac{1}{3} = 12$, and from the remainder $\frac{1}{2} = 12$, he would have obtained the same result which he has found by his method ($60 - \frac{1}{5} = 48, - \frac{1}{4} = 36, - \frac{1}{3} = 24, - \frac{1}{2} = 12$).

It is possible that Paulisa simply mentions this method as one among others, and that it is not that one in particular which he himself adopted. A translation of his whole work into Arabic has not hitherto yet been undertaken, because in his mathematical problems there is an evident religious and theological tendency.

Pulisa calculates how much of the life of Brahman has elapsed before the present *kalpa*.

Pulisa deviates from the rule which he himself gives when he wants to compute how many of our years have elapsed of the life of Brahman before the present *kalpa*. Up to the time of his writing, eight years five months and four days of a new *kalpa* had elapsed. He counts 6068 *kalpas*. As, according to him, a *kalpa* has 1008 *caturyugas*, he multiplies this number by 1008 and gets 6,116,544 *caturyugas*. These he changes into *yugas* by multiplying them by 4, and he gets 24,466,176 *yugas*. As a *yuga*, according to him, has 1,080,000 years, he multiplies the number of *yugas* by 1,080,000, and gets as the product 26,423,470,080,000, *i.e.* the number of years which have elapsed of the life of Brahman before the present *kalpa*. Page 189.

Criticisms on this calculation.

Perhaps it will seem strange to the followers of Brahmagupta that he (Pulisa) has not changed the *caturyugas* into exact *yugas*, but simply changed them into fourth parts (by dividing them by 4), and multiplied these fourth parts by the number of years of a single fourth part.

Now, we do not ask him what is the use of representing the *caturyugas* as fourth parts, inasmuch as they have no fraction which, in this manner, must be reduced to wholes. The multiplication of the whole *caturyugas* by the years of one complete *caturyuga*, *i.e.* 4,320,000, would have been sufficiently lengthy. We, however, say that he would be correct in doing so if he had not been influenced by the wish of bringing the elapsed years of the present *kalpa* into relation with the last-mentioned number, and multiplied the complete elapsed *manvantaras* by 72 in agreement with his theory; further, if he had not multiplied the product by the years of a *caturyuga*, which gives the product of 1,866,240,000 years, and, moreover, had not multiplied the number of the complete *caturyugas* which have elapsed of the current *manvantara* by the years of a single *caturyuga*, which gives the product of 116,640,000 years. Of the current *caturyuga* there have elapsed three *yugas*, *i.e.* according to him, 3,240,000 years. The latter number represents three-fourths of the years of a *caturyuga*. He uses the same number when computing the week-day of a date by means of the number of the days of the here-mentioned number of years. If he believed in the above-mentioned rule, he would use it where it is required, and he would reckon the three *yugas* as nine-tenths of a *caturyuga*.

Brahmagupta's harsh criticisms on Âryabhaṭa.

Now, it is evident that that which Brahmagupta relates on his authority, and with which he himself agrees, is entirely unfounded; but he is blind to this from sheer hatred of Âryabhaṭa, whom he abuses excessively. And in this respect Âryabhaṭa and Pulisa are the same to him. I take for witness the passage of Brahmagupta where he says that Âryabhaṭa has subtracted something from the cycles of the *Caput Draconis* and of the *apsis* of the moon, and thereby rendered confused the computation of the eclipse. He is rude enough to compare Âryabhaṭa to a worm which, eating the wood, by chance describes certain characters in it, without understanding them and without intending to draw them. "He, however, who knows these things thoroughly stands opposite to Âryabhaṭa, Śrîsheṇa, and Vishṇucandra like the lion against gazelles. They are not capable of letting him see their faces." In such offensive terms he attacks Âryabhaṭa and maltreats him.

Different lengths of the solar year.

We have already mentioned (v. chap. xli.) how many civil days (*sâvana*) a *caturyuga* has according to the three scholars. Pulisa gives it 1350 days more than Brahmagupta, but the number of years of a *caturyuga* is the same according to both. Therefore, evidently Pulisa gives the solar year more days than Brahmagupta. To judge from the report of Brahmagupta, Âryabhaṭa gives a *caturyuga* 300 days less than Pulisa, and 1050 more than Brahmagupta. Accordingly, Âryabhaṭa must reckon the solar year longer than Brahmagupta and shorter than Pulisa.

CHAPTER XLIII.

A DESCRIPTION OF THE FOUR YUGAS, AND OF ALL THAT IS EXPECTED TO TAKE PLACE AT THE END OF THE FOURTH YUGA.

THE ancient Greeks held regarding the earth various opinions, of which we shall relate one for the sake of an example.

On natural cataclysms. The disasters which from time to time befal the earth, both from above and from below, differ in quality and Page 190. quantity. Frequently it has experienced one so incommensurable in quality or in quantity, or in both together, that there was no remedy against it, and that no flight or caution was of any avail. The catastrophe comes on like a deluge or an earthquake, bringing destruction either by the breaking in of the surface, or by drowning with water which breaks forth, or by burning with hot stones and ashes that are thrown out, by thunderstorms, by landslips, and typhoons; further, by contagious and other diseases, by pestilence, and more of the like. Thereby a large region is stripped of its inhabitants; but when after a while, after the disaster and its consequences have passed away, the country begins to recover and to show new signs of life, then different people flock there together like wild animals, who formerly were dwelling in hiding-holes and on the tops of the mountains. They become civilised by assisting each other against common foes, wild beasts or men, and furthering each other in the hope for a life in safety and joy. Thus they increase to great numbers; but then ambition, circling round them with the wings of wrath and envy, begins to disturb the serene bliss of their life.

Sometimes a nation of such a kind derives its pedigree from a person who first settled in the place or distinguished himself by something or other, so that he alone continues to live in the recollection of the succeeding generations, whilst all others beside him are forgotten. Plato mentions in the *Book of Laws* Zeus, *i.e.* Jupiter, as the forefather of the Greeks, and to Zeus is traced back the pedigree of Hippocrates, which is mentioned in the last chapters added at the end of the book. We must, however, observe that the pedigree contains only very few generations, not more than fourteen. It is the following:—Hippokrates—Gnosidikos—Nebros—Sostratos — Theodoros — Kleomyttades — Krisamis — Dardanas—Sostratos—ابلوسوس (?)—Hippolochos—Podaleirios—Machaon—Asclepios—Apollo—Zeus—Kronos, *i.e.* Saturn.

Pedigree of Hippocrates.

Hindu notions regarding the four ages or *yugas*.

The Hindus have similar traditions regarding the Caturyuga, for according to them, at the beginning of it, *i.e.* at the beginning of Kṛitayuga, there was happiness and safety, fertility and abundance, health and force, ample knowledge and a great number of Brahmans. The good is complete in this age, like four-fourths of a whole, and life lasted 4000 years alike for all beings during this whole space of time.

Thereupon things began to decrease and to be mixed with opposite elements to such a degree, that at the beginning of Tretâyuga the good was thrice as much as the invading bad, and that bliss was three-quarters of the whole. There were a greater number of Kshatriyas than of Brahmans, and life had the same length as in the preceding age. So it is represented by the *Vishṇu-Dharma*, whilst analogy requires that it should be shorter by the same amount than bliss is smaller, *i.e.* by one-fourth. In this age, when offering to the fire, they begin to kill animals and to tear off plants, practices which before were unknown.

Thus the evil increases till, at the beginning of Dvâpara, evil and good exist in equal proportions, and likewise bliss and misfortune. The climates begin to differ, there is much killing going on, and the religions become different. Life becomes shorter, and lasts only 400 years, according to the *Vishṇu-Dharma*. At the beginning of Tishya, *i.e.* Kaliyuga, evil is thrice as much as the remaining good.

The Hindus have several well-known traditions of events which are said to have occurred in the Tretâ and Dvâpara *yugas*, *e.g.* the story of Râma, who killed Ravaṇa; that of Paraśurâma the Brahman, who killed every Kshatriya he laid hold upon, revenging on them the death of his father. They think that he lives in heaven, that he has already twenty-one times appeared on earth, and that he will again appear. Further, the story of the war of the children of Pâṇḍu with those of Kuru. Page 191.

In the Kaliyuga evil increases, till at last it results in the destruction of all good. At that time the inhabitants of the earth perish, and a new race rises out of those who are scattered through the mountains and hide themselves in caves, uniting for the purpose of worshipping and flying from the horrid, demoniac human race. Therefore this age is called *Kṛitayuga*, which means "Being ready for going away after having finished the work."

Description of the Kaliyuga.

In the story of Śaunaka which Venus received from Brahman, God speaks to him in the following words: "When the Kaliyuga comes, I send Buddhodana, the son of Śuddhodana the pious, to spread the good in the creation. But then the *Muḥammira*, *i.e.* the red-wearing ones, who derive their origin from him, will change everything that he has brought, and the dignity of the Brahmans will be gone to such a degree that a Śûdra, their servant, will be impudent towards them, and that a Śûdra and Caṇḍâla will share with them the presents and offerings. Men will entirely be occupied with gathering wealth by crimes, with hoarding up, not refraining from committing horrid and sinful crimes. All this will result in a rebellion of the small ones against the great ones, of the children against their parents, of the servants against their masters. The castes will be in uproar against each other, the genealogies will become confused, the four castes will be abolished, and there will be many religions and sects. Many books will be composed, and the communities which formerly were united will on account of them be dissolved into single individuals. The temples will be destroyed and the schools will lie waste. Justice will be gone, and the kings will not know anything but oppression and spoliation, robbing and destroying, as if they wanted to devour the people, foolishly indulging in far-reaching hopes, and not considering how short life is in comparison with the sins (for which they have to atone). The more the mind of people is depraved, the more will pestilential diseases be prevalent. Lastly, people maintain that most of the astrological rules obtained in that age are void and false.

Saying of Mânî.

These ideas have been adopted by Mânî, for he says: "Know ye that the affairs of the world have been changed and altered; also priesthood has been changed since the *σφαῖραι* of heaven, *i.e.* the spheres, have been changed, and the priest can no longer acquire such a knowledge of the stars in the circle of a sphere as their fathers were able to acquire. They lead mankind astray by fraud. What they prophesy may by chance happen, but frequently it does not happen."

Description of the Kṛitayuga according to *Vishṇu-Dharma.*

The description of these things in the *Vishṇu-Dharma* is much more copious than we have given it. People will be ignorant of what is reward and punishment; they will deny that the angels have absolute knowledge. Their lives will be of different length, and none of them will know how long it is. The one will die as an embryo, the other as a baby or child. The pious will be torn away and will not have a long life, but he who does evil and denies religion will live longer. Śûdras will be kings, and will be like rapacious wolves, robbing the others of all that pleases them. The doings of the Brahmans will be of the same kind, but the majority will be Śûdras and brigands. The laws of the Brahmans will be abolished. People will point with their fingers at those who worry themselves with the practice of frugality and poverty as a curiosity, will despise them, and will wonder at a man worshipping Vishṇu; for all of them have become of the same (wicked) character. Therefore any wish will soon be granted, little merit receive great reward, and honour and dignity be obtained by little worship and service.

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But finally, at the end of the *yuga*, when the evil will have reached its highest pitch, there will come forward Garga, the son of J-Ś-V (?) the Brahman, *i.e.* Kali, after whom this *yuga* is called, gifted with an irresistible force, and more skilled in the use of any weapon than any other. Then he draws his sword to make good all that has become bad; he cleans the surface of the earth of the impurity of people and clears the earth of them. He collects the pure and pious ones for the purpose of procreation. Then the Kṛitayuga lies far behind them, and the time and the world return to purity, and to absolute good and to bliss.

This is the nature of the *yugas* as they circle round through the Caturyuga.

The origin of medicine according to the book *Caraka*.

The book *Caraka*, as quoted by ʿAlî Ibn Zain of Ṭabaristan, says: "In primeval times the earth was always fertile and healthy, and the elements or *mahabhûta* were equally mixed. Men lived with each other in harmony and love, without any lust and ambition, hatred and envy, without anything that makes soul and body ill. But then came envy, and lust followed.

Driven by lust, they strove to hoard up, which was difficult to some, easy to others. All kinds of thoughts, labours, and cares followed, and resulted in war, deceit, and lying. The hearts of men were hardened, the natures were altered and became exposed to diseases, which seized hold of men and made them neglect the worship of God and the furtherance of science. Ignorance became deeply rooted, and the calamity became great. Then the pious met before their anchorite Kṛiśa (?) the son of Âtreya, and deliberated; whereupon the sage ascended the mountain and threw himself on the earth. Thereafter God taught him the science of medicine."

Quotation from Aratus.

All this much resembles the traditions of the Greeks, which we have related (in another place). For Aratus says in his *Φαινόμενα*, and in his intimations referring to the seventh zodiacal sign: "Look under the feet of the Herdsman, *i.e. Alʿawwâ*, among the northern figures, and you see the Virgin coming with a blooming ear of corn in her hand, *i.e. Alsimâk Alʿaʿzal.* She belongs either to the star-race, which are said to be the forefathers of the ancient stars, or she was procreated by another race which we do not know. People say that in primeval times she lived among mankind, but only among women, not visible to men, being called *Justice.* She used to unite the aged men and those who stood in the market-places and in the streets, and exhorted them with a loud voice to adhere to the truth. She presented mankind with innumerable wealth and bestowed rights upon them. At that time the earth was called *golden.* None of its inhabitants knew pernicious hypocrisy in deed or word, and there was no objectionable schism among them. They lived a quiet life, and did not yet navigate the sea in ships. The cows afforded the necessary sustenance.

"Afterwards, when the golden race had expired and the silver race come on, Virgo mixed with them, but without being happy, and concealed herself in the mountains, having no longer intercourse with the women as formerly. Then she went to the large towns, warned their inhabitants, scolded them for their evil doings, Page 193. and blamed them for ruining the race which the *golden fathers* had left behind. She foretold them that there would come a race still worse than they, and that wars, bloodshed, and other great disasters would follow.

"After having finished, she disappeared into the mountains till the silver race expired and a bronze race came up. People invented the sword, the doer of evil; they tasted of the meat of cows, the first who did it. By all this their neighbourhood became odious to Justice, and she flew away to the sphere."

A scholion on Aratus. The commentator of the book of Aratus says: "This Virgin is the daughter of Zeus. She spoke to the people on the public places and streets, and at that time they were obedient to their rulers, not knowing the bad nor discord. Without any altercation or envy they lived from agriculture, and did not travel on sea for the sake of commerce nor for the lust of plunder. Their nature was as pure as gold.

"But when they gave up these manners and no longer adhered to truth, Justice no longer had intercourse with them, but she observed them, dwelling in the mountains. When, however, she came to their meetings, though unwillingly, she threatened them, for they listened in silence to her words, and therefore she no longer appeared to those who called her, as she had formerly done.

"When, then, after the silver race, the bronze race came up, when wars followed each other and the evil spread in the world, she started off, for she wanted on no account to stay with them, and hated them, and went towards the sphere.

"There are many traditions regarding this Justice.

According to some, she is Demeter, because she has the ear of corn; according to others, she is *Τύχη*."

This is what Aratus says.

The following occurs in the third book of the Laws of Plato:— Quotation from the Laws of Plato.

"The Athenian said, 'There have been deluges, diseases, disasters on earth, from which none has been saved but herdsmen and mountaineers, as the remnants of a race not practised in deceit and in the love of power.'

"The Knossian said, 'At the beginning men loved each other sincerely, feeling lonely in the desert of the world, and because the world had sufficient room for all of them, and did not compel them to any exertion. There was no poverty among them, no possession, no contract. There was no greed among them, and neither silver nor gold. There were no rich people among them and no poor. If we found any of their books, they would afford us numerous proofs for all this.'"

CHAPTER XLIV.

ON THE MANVANTARAS.

The single *manvantaras*, their Indras, and the children of Indra.

As 72,000 *kalpas* are reckoned as the life of Brahman, the *manvantara*, *i.e.* period of Manu, is reckoned as the life of Indra, whose rule ends with the end of the period. His post is occupied by another Indra, who then rules the world in the new *manvantara*. Brahmagupta says: "If a man maintains that there is no *saṁdhi* between two *manvantaras*, and reckons each *manvantara* as 71 *caturyugas*, he will find that the *kalpa* is too short by six *caturyugas*, and the *minus* below 1000 (*i.e.* in 994) is not better than the *plus* above 1000 (*i.e.* in 1008, according to Âryabhaṭa). Both numbers, however, differ from the book *Smṛiti*."

Further he says: "Âryabhaṭa mentions in two books of his, the one of which is called *Daśagîtikâ*, the other *Âryâśṭaśata*, that each *manvantara* is equal to 72 *caturyugas*. Accordingly he reckons a *kalpa at* 1008 *caturyugas* (14 × 72)."

In the book *Vishṇu-Dharma* Mârkaṇḍeya gives to Vajra the following answer: "Purusha is the lord of the universe; the lord of the *kalpa* is Brahman, the lord of the world; but the lord of the *manvantara* is Manu. There are fourteen Manus, from whom the kings of the earth, ruling at the beginning of each *manvantara*, descended."

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We have united their names in the following table:—

The Number of the Manvantaras.	The Names of the Manvantaras according to the Vishṇu-Purâṇa.	Their Names according to the Vishṇu-Dharma.	Their Names taken from other Sources.	The Names of Indra according to the Vishṇu-Purâṇa.	The Names of the children of Manu, the kings of the earth who ruled at the beginning of each period, according to the Vishṇu-Purâṇa.
1	Svâyambhuva	Svâyambhuva	Svâyambhuva	Manu, as the ruler of the first manvantara, is Indra, who has nothing in common with any other being.[1]	
2	Svârocisha	Svârociya	Svârocisha	Vipaścit	The first of the children of Manu, Caitraka (?)
3	Auttami	Auttami	Auttami	Suśânti	Sudivya (?)
4	Stâmasa (?)	Stâmasa	Utâmasa (?)	Śikhin	Nara, Khyâti, Śântahaya, Jânujaṅgha.
5	Raivata	Raivata	Raivata	Autata (?)	Balabandhu, Susaṁbhâvya, Satyaka, Sindhu (?), Rebha (?)
6	Câkshusha	Cakshukha	Câkshusha	Manojava	Puru, Muru, Śatadyumna, Pramukha (?)
7	Vaivasvata	Vaivasvata	Vaivasvata	Purandara	Ikshvâku, Nabasa (?), Dhṛishṇa, Śaryâti.
8	Sâvarṇi	Sâvarṇi	These five are called Sâvarṇi. Sâvarṇi	Bali, the imprisoned king	Virajas, Aścârvari, Nirmogha.
9	Daksha	Vishṇu-Dharma	Brahmaputra	Mahâvîrya	Dhṛitaketu, Nirâmaya, Pañcahasta.
10	Brahmasâvarṇi	Dharmaputra	Vishṇuputra	Śânti	Sukshetra, Uttamaujas, Bhûrisheṇa.
11	Dharmasâvarṇi	Rudraputra	Rudraputra	Vṛisha	Sarvatraga, Devânîka, Sudharmâtman (?)
12	Rudraputra	Dakshaputra	Dakshaputra	Ṛitadhâman	Devata (?), Vânupadevaś-ca, Devaśreshṭha.
13	Raucya	Raibhya (?)	Raibhya (?)	Divaspati	Citrasena, Vicitra-âdyâ (!)
14	Bhautya	Bhautya	Bhûmi (?)	Śuci	Urur, Gabhira, Budhaya-âdyâ (!)

Page 195. The tradition of *Vishnu-Purâṇa* relating to the *manvantaras*.

The difference which the reader perceives in the enumeration of the future *manvantaras* beyond the seventh one, arises, as I think, from the same cause whence the difference in the names of the *Dvîpas* is derived (v. pp. 235, 236), viz. from the fact that the people care more for the *names* than for the *order* in which they are handed down to posterity. We may here rely on the tradition of the *Vishṇu-Purâṇa*, for in this book their number, their names and descriptions, are given in such a way that renders it necessary to us to consider also the *order* in which it gives them as trustworthy. But we have refrained from communicating these things in this place, since they offer only very little use.

The same book relates that King Maitreya, a Kshatriya, asked Parâśara, the father of Vyâsa, about the past and the future *manvantaras*. Thereupon the latter mentions the name by which each Manu is known, the same names which our table exhibits. According to the same book, the children of each Manu will rule the earth, and it mentions the first of them, the names of whom we have given in the table. According to the same source, the Manus of the second, third, fourth, and fifth *manvantaras* will be of the race of *Priyavrata*, an anchorite, who stood in such favour with Vishṇu, that he honoured his children by raising them to this distinction.

CHAPTER XLV.

ON THE CONSTELLATION OF THE GREAT BEAR.

A tradition relating to Arundhatî, the wife of Vasishṭha.

THE Great Bear is in the Indian language called *Saptarshayas*, i.e. *the Seven Ṛishis.* They are said to have been anchorites who nourished themselves only with what it is allowable to eat, and with them there was a pious woman, *Al-suhâ* (*Ursa Major,* star 80 by ζ). They plucked off the stalks of the lotus from the ponds to eat of them. Meanwhile came *The Law* (*Dharma?*) and concealed her from them. Every one of them felt ashamed of the other, and they swore oaths which were approved of by *Dharma.* In order to honour them, *Dharma* raised them to that place where they are now seen (*sic*).

Quotation from Varâhamihira.

We have already mentioned that the books of the Hindus are composed in metres, and therefore the authors indulge in comparisons and *epitheta ornantia,* such as are admired by their countrymen. Of the same kind is a description of the Great Bear in the *Saṁhitâ* of Varâhamihira, where it occurs before the astrological prognostics derived from this constellation. We give the passage according to our translation:[1]—

"The northern region is adorned with these stars, as a beautiful woman is adorned with a collar of pearls strung together, and a necklace of white lotus flowers, a handsomely arranged one. Thus adorned, they are like maidens who dance and revolve round the pole as the pole orders them. And I say, on the authority of

---

[1] *Saṁhitâ*, chap. xiii. v. 1-6.

Garga, the ancient, the primeval one, that the Great Bear stood in Maghâ, the tenth lunar station, when Yudhishṭhira ruled the earth, and the Śakakâla was 2526 years after this. The Great Bear remains in each lunar station 600 years, and it rises in the north-east. He (of the Seven Rishis) who then rules the east is Marîci; west of him is Vasishṭha, then Aṅgiras, Atri, Pulastya, Pulaha, Kratu, and near Vasishṭha there is a chaste woman called Arundhatî."

As these names are sometimes confounded with each other, we shall try to identify them with the corresponding stars in the Great Bear:—

Marîci	is	the 27th	star	of this	constellation.
Vasishṭha	„	26th	„	„	„
Aṅgiras	„	25th	„	„	„
Atri	„	18th	„	„	„
Kratu	„	16th	„	„	„
Pulaha	„	17th	„	„	„
Pulastya	„	19th	„	„	„

Criticisms on Garga.

These stars occupy in our time, *i.e.* in the 952nd year of the Śakakâla, the space between 1⅓° of Leo and 13½° of Spica (Virgo). According to the peculiar motion of the fixed stars, as we know it, the same stars occupied at the time of Yudhishṭhira the space between 8⅔° Gemini and 20⅚° of Cancer.

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According to the motion of the fixed stars, as adopted by the ancient astronomers and Ptolemy, these stars occupied at that time the space between 26½° of Gemini and 8⅔° of Leo, and the here-mentioned lunar station (Maghâ) occupied the space between 0 – 800 minutes in Leo.

Therefore it would be much more suitable *in the present time* to represent the Seven Rishis as standing in Maghâ than in the time of Yudhishṭhira. And if the Hindus identify Maghâ with the *Heart of the Lion*, we can only say that this constellation at that time stood in the first degrees of Cancer.

The words of Garga are without any foundation; they only show how little he knew of that which every one must know who wants to fix the places of the stars, either by eyesight or by means of astronomical observation on certain degrees of the signs of the zodiac.

Note from a Kashmirian almanac.

I have read in the almanacs for the year 951 of the Śakakâla which came from Kashmîr the statement that the Seven Ṛishis stand since seventy-seven years in the lunar station Anurâdhâ. This station occupies the space between 3⅓° and the end of 16⅔° of Scorpio. However, the Seven Ṛishis precede this place by about a whole zodiacal sign and 20 degrees, *i.e.* by 1⅔ signs (v. p. 390). But what man would be able to learn all the different theories of the Hindus, if he does not dwell among them!

Examination of the statements regarding the position of the Great Bear.

Let us now first suppose that Garga is right, that he has not stated the precise place in Maghâ which the Seven Ṛishis occupy, and let us suppose that this place was 0° of Maghâ, which would correspond to 0° of Leo for our time. Further, between the time of Yudhishṭhira and the present year, *i.e.* the year 1340 of Alexander, there is an interval of 3479 years. And, lastly, let us suppose that Varâhamihira is right in saying that the Seven Ṛishis dwell 600 years in each lunar station. Accordingly, they ought in the present year to stand in 17° 18′ of Libra, which is identical with 10° 38′ of Svâtî. However, if we suppose that they stood in the midst of Maghâ (not in the beginning), they ought at present to stand in 3° 58′ of Viśâkhâ. And if we suppose that they stood *in the end* of Maghâ, they ought at present to stand in 10° 38′ of Viśâkhâ.

Hence it is evident that the statement of the Kashmirian calendar does not agree with the statement in the *Saṁhitâ*. Likewise, if we adopt the rule of the said calendar regarding the precession of the equinoxes, and reckon with this measure backward, we do by no means arrive at Maghâ as the lunar station in which the Seven Ṛishis stood in the time of Yudhishṭhira.

Hitherto we used to think that *in our time* the revolution of the fixed stars is more rapid than *in former times*, and we tried to account for this by peculiarities of the shape of the celestial sphere. According to us, they move one degree in 66 solar years. Therefore Varâhamihira highly astonishes us, for, according to him, the rate of this motion would be one degree in forty-five years, *i.e.* much more rapid than at present, whilst *his* time precedes ours only by 525 years.

Rule of the Karaṇasâra to find the position of the Great Bear at any time.

The author of the canon *Karaṇasâra* gives the following rule for the computation of the motion of the Great Bear, and of the place which, at any given time, it occupies :—

"Subtract 821 from the Śakakâla. The remainder is the *basis*, *i.e.* the number of years above 4000 which have elapsed since the beginning of the Kaliyuga.

"Multiply the basis by 47, and add 68,000 to the product. Divide the sum by 10,000. The quotient represents the zodiacal signs and fractions of them, *i.e.* the position of the Great Bear which was sought."

The addition of 68,000, prescribed in this rule, must be the original position of the Great Bear at the beginning of the *basis*, multiplied by 10,000. If we divide 68,000 by 10,000, we get the quotient $6\frac{4}{5}$, *i.e.* six zodiacal signs and twenty-four degrees of a seventh sign.

It is evident that if we divide the 10,000 by 47, the Great Bear has wandered through one zodiacal sign in 212 years, 9 months, and 6 days, according to solar time. Accordingly it wanders through one degree of a sign in 7 years, 1 month, and 3 days, and through one lunar station in 94 years, 6 months, and 20 days.

Now there is a great difference between the values of Varâhamihira and those of Vitteśvara, if there is not a fault in the tradition. If we, by way of an example make such a computation for the present year (1030 A.D.), we get 9° 17′ in the lunar station Anurâdhâ as the position of the Great Bear.

The people of Kashmîr believed that the Great Bear wanders through a lunar station in 100 years. Therefore the above-mentioned calendar says that of the present *centennium* of the motion of the Great Bear there is still a remainder of twenty-three years.

Theological opinions mixed up with astronomy.

Mistakes and confusion such as we have here laid open arise, in the first place, from the want of the necessary skill in astronomical researches, and secondly, from the way of the Hindus of mixing up scientific questions with religious traditions. For the theologians believe that the Seven Ṛishis stand higher than the fixed stars, and they maintain that in each *manvantara* there will appear a new Manu, whose children will destroy the earth; but the rule will be renewed by Indra, as also the different classes of the angels and the Seven Ṛishis. The angels are necessary, for mankind must offer sacrifices to them and must bring to the fire the shares for them; and the Seven Ṛishis are necessary, because they must renew the Veda, for it perishes at the end of each *manvantara*. Page 197.

The Seven Ṛishis in the different *manvantaras*.

Our information on this subject we take from the *Vishṇu-Purâṇa*. From the same source we have taken the names of the Seven Ṛishis in each *manvantara*, as exhibited by the following table:—

Numbers of the Manvantaras.	The Seven Ṛishis, *i.e.* the Banât-Na'sh, or the Stars of the Great Bear in the Manvantaras.						
	1	2	3	4	5	6	7
1	In this Manvantara there was neither Indra nor the Seven Ṛishis, but only Manu.						
2	Ûrjastambha	Prâṇa	Datta	Niṛishabha	Niśvara	Ścorvarî (?)	Vâṁśca (!)
3	The Children of Vasishṭha.						
4	Jyoti	Dhâman	Pṛithu	Kâvya	Caitra and Agni	Varaka	Pîvara
5	Hiraṇyaroman	Vedaśrî	Rûrdhwabâhu (!)	Apara (!)	Vedabâhu	Subâhu	Parjanya
6	Sumedhas	Virajas	Havishmat	Madhu	Atinâman'	Sahishṇu	Carshayaḥ (!)
7	Vasishṭha	Kaśyapa	Atri	Jamadagni	Gautama	Viśvâmitra	Bharadvâja
8	Dîptimat	Gâlava	Kṛipa	Aśvatthâman the son of Droṇa	Parâśara	Vyâsa the son of Parâśara	Ṛishyaśriṅga
9	Savana	Dyutimat	Havya	Vasu	Medhâdhṛiti	Jyotishmat	Satya
10	Havishmat	Sukṛiti	Satya	Apâṁmûrti	Nâbhâga	Apratimaujas	Sukshetra
11	Niścara	Agnîdhra	Vapushmat	Vishṇu	Âruṇi	Havishmant	Nagha
12	Tapasvin	Sutaya	Tapomûrti	Taporati	Tapodhṛiti	Dyuti	Iścânyaḥ (!)
13	Nirmoha	Tattvadarśica	Nishprakampa	Nirutsuka	Dhṛitimant	Vyaya	Sutapas
14	Agniba	Śuci	Śukra or Venus	Mâgadha	Agnîdhra	Yuktasta	Jita

CHAPTER XLVI.

ON NÂRÂYAṆA, HIS APPEARANCE AT DIFFERENT TIMES, AND HIS NAMES.

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On the nature of Nârâyaṇa.

NÂRÂYAṆA is according to the Hindus a supernatural power, which does not on principle try to bring about the good by the good, nor the bad by the bad, but to prevent the evil and destruction by whatever means happen to be available. For this force the good exists prior to the bad, but if the good does not properly develop nor is available, it uses the bad, this being unavoidable. In so doing, it may be compared to a rider who has got into the midst of a cornfield. When he then comes back to his senses, and wants to avoid evil-doing and to get out of the mischief he has committed, he has no other means but that of turning his horse back and riding out on the same road on which he has entered the field, though in going out he will do as much mischief as he has done in entering, and even more. But there is no other possibility of making amends save this.

The Hindus do not distinguish between this force and the *First Cause* of their philosophy. Its dwelling in the world is of such a nature that people compare it to a material existence, an appearance in body and colour, since they cannot conceive any other kind of appearance.

Besides other times, Nârâyaṇa has appeared at the end of the first *manvantara*, to take away the rule of the worlds from Vâlakhilya (?), who had given it the name, and wanted to take it into his own hands. Nârâyaṇa came and handed it over to Śatakratu, the performer of a hundred sacrifices, and made him Indra.

Story of Bali, the son of Virocana.

Another time he appeared at the end of the sixth *manvantara*, when he killed the King Bali, the son of Virocana, who ruled the whole world and had Venus as his vazîr. On having heard from his mother that the time of his father had been much better than *his* time, since it was nearer the *kṛitayuga*, when people enjoyed more profound bliss and did not know any fatigue, he became ambitious and desirous of vying with his father. Therefore he commenced doing works of piety, giving presents, distributing money, and performing sacrifices, which earn the rule of paradise and earth for him who finishes a hundred of them. When he was near this term, or had nearly finished the ninety-ninth sacrifice, the angels began to feel uneasy and to fear for their dignity, knowing that the tribute which men bring them would cease if they stood no longer in need of them. Now they united and went to Nârâyaṇa, asking him to help them. He granted their wish, and descended to the earth in the shape of Vâmana, *i.e.* a man whose hands and feet are too short in comparison with his body, and in consequence his figure is thought to be hideous.

Nârâyaṇa came to the King Bali whilst he was offering, his Brahmans standing round the fires, and Venus, his vazîr, standing before him. The treasure-houses had been opened and the precious stones had been thrown out in heaps, to be given as presents and alms. Now Vâmana commenced to recite the Veda like the Brahmans from that part which is now called *Sâmaveda*, in a melancholy, impressive kind of melody, persuading the king to grant him liberally what he would wish and demand. Upon this Venus spoke stealthily to him: "This is Nârâyaṇa. He has come to rob thee of thy rule." But the king was so excited that he did not mind the words of Venus, and asked Vâmana what was his desire. Thereupon Vâmana said, "As much as four paces of thy realm, that I may live there." The king answered, "Choose what you wish, and how you wish it;" and according to Hindu custom, he ordered water to be brought to pour it over his hands as a sign of the confirmation of the order he had given. Now Venus, because of her love to the king, brought in the jug, but had corked the spout, so that no water should flow out of it, whilst she closed the hole in the cork with the *kuśa* grass of her ring-finger. But Venus Page 199. had only one eye; she missed the hole, and now the water flowed out. In consequence, Vâmana made a pace towards east, another towards west, and a third towards above as far as Svarloka. As for the fourth pace, there was no more space in the world; he made, by the fourth pace, the king a slave, putting his foot between his shoulders as a sign of making him a slave. He made him sink down into the earth as far as Pâtâla, the lowest of the low. He took the worlds away from him, and handed the rule over to Puraṁdara.

Quotation from *Vishṇu-Purâṇa.*

The following occurs in the *Vishṇu-Purâṇa*:—

"The King Maitreya asked Parâśara about the *yugas*. So the latter answered, 'They exist for the purpose that Vishṇu should occupy himself with something in them. In the Kṛitayuga he comes in the shape of Kapila alone, for the purpose of spreading wisdom; in Tretâyuga, in the shape of Râma alone, for the purpose of spreading fortitude, to conquer the bad, and to preserve the three worlds by force and the prevalence of virtuous action; in Dvâpara, in the shape of Vyâsa, to divide the Veda into four parts, and to derive many branches from it. In the end of Dvâpara he appears in the shape of Vâsudeva to destroy the giants; in the Kaliyuga, in the shape of Kali, the son of *J-sh-v* (?) the Brahman, to kill all, and to make the cycle of the *yugas* commence anew. That is his (Vishṇu's) occupation.'"

In another passage of the same book we read: "Vishṇu, *i.e.* another name for Nârâyaṇa, comes at the end of each *dvâpara* to divide the Veda into four parts, because men are feeble and unable to observe the whole of it. In his face he resembles Vyâsa."

Enumeration of the Vyâsas of the seventh *manvantara.*

We exhibit his names in the following table, though they vary in different sources, enumerating the Vyâsas who have appeared in the *caturyugas* of the present or seventh *manvantara* which have elapsed:—

1	Svayaṁbhû	16	Dhanaṁjaya
2	Prajâpati	17	Kṛitaṁjaya
3	Uśanas	18	Riṇajyeshṭha (?)
4	Bṛihaspati	19	Bharadvâja
5	Savitṛi	20	Gautama
6	Mṛityu	21	Uttama
7	Indra	22	Haryâtman
8	Vasishṭha	23	Veda-vyâsa
9	Sârasvata	24	Vâjaśravas
10	Tridhâman	25	Somaśushma
11	Trivṛisha	26	Bhârgava
12	Bharadvâja	27	Vâlmîki
13	Antariksha	28	Kṛishna
14	Vapra (?)	29	Aśvatthâman the son of Droṇa
15	Trayyâruṇa		

Kṛishṇa Dvaipâyana is Vyâsa the son of Parâśara. The twenty-ninth Vyâsa has not yet come, but will appear in future.

Quotation from *Vishṇu-Dharma.*

The book *Vishṇu-Dharma* says: "The names of Hari, *i.e.* Nârâyaṇa, differ in the *yugas.* They are the following: Vâsudeva, Saṁkarshaṇa, Pradyumna, and Aniruddha."

I suppose that the author has not here preserved the proper sequence, for Vâsudeva belongs to the end of the four *yugas.*

The same book says: "Also his colours differ in the *yugas.* In the Kṛitayuga he is white, in the Tretâyuga red, in the Dvâpara yellow, the latter is the first phase of his being embodied in human shape, and in the Kaliyuga he is black."

These colours are something like *the three primary forces* of their philosophy, for they maintain that *Satya* is transparent white, *Rajas* red, and *Tamas* black. We Page 200.
shall in a later part of this book give a description of his last appearance in the world.

CHAPTER XLVII.

ON VÂSUDEVA AND THE WARS OF THE BHÂRATA.

Analogies of the course of nature to the history of mankind.

THE life of the world depends upon sowing and procreating. Both processes increase in the course of time, and this increase is unlimited, whilst the world is limited.

When a class of plants or animals does not increase any more in its structure, and its peculiar kind is established as *a species* of its own, when each individual of it does not simply come into existence once and perish, but besides procreates a being like itself or several together, and not only once but several times, then this will as a single species of plants or animals occupy the earth and spread itself and its kind over as much territory as it can find.

The agriculturist selects his corn, letting grow as much as he requires, and tearing out the remainder. The forester leaves those branches which he perceives to be excellent, whilst he cuts away all others. The bees kill those of their kind who only eat, but do not work in their beehive.

Nature proceeds in a similar way; however, it does not distinguish, for its action is under all circumstances one and the same. It allows the leaves and fruit of the trees to perish, thus preventing them from realising that result which they are intended to produce in the economy of nature. It removes them so as to make room for others.

If thus the earth is ruined, or is near to be ruined, by having too many inhabitants, its ruler—for it has a ruler, and his all-embracing care is apparent in every single particle of it—sends it a messenger for the purpose of reducing the too great number and of cutting away all that is evil.

Story of the birth of Vâsudeva.

A messenger of this kind is, according to the belief of the Hindus, Vâsudeva, who was sent the last time in human shape, being called Vâsudeva. It was a time when the giants were numerous on earth and the earth was full of their oppression; it tottered, being hardly able to bear the whole number of them, and it trembled from the vehemence of their treading. Then there was born a child in the city of Mathurâ to Vâsudeva by the sister of Kaṁsa, at that time ruler of the town. They were a Jatt family, cattle-owners, low Śûdra people. Kaṁsa had learned, by a voice which he heard at the wedding of his sister, that he would perish at the hands of her child; therefore he appointed people who were to bring him every child of hers as soon as she gave birth to it, and he killed all her children, both male and female. Finally, she gave birth to Balabhadra, and Yaśodâ, the wife of the herdsman Nanda, took the child to herself, and managed to keep it concealed from the spies of Kaṁsa. Thereupon she became pregnant an eighth time, and gave birth to *Vâsudeva* in a rainy night of the eighth day of the black half of the month Bhâdrapada, whilst the moon was ascending in the station Rohiṇî. As the guards had fallen into deep sleep and neglected the watch, the father stole the child and brought it to *Nandakula*, *i.e.* the stable of the cows of Nanda, the husband of Yaśodâ, near Mathurâ, but separated from this place by the river Yamunâ. Vâsudeva exchanged the child for a daughter of Nanda, which happened to be born at the moment when Vâsudeva arrived with the boy. He brought this female child to the guards instead of his son. Kaṁsa, the ruler, wanted to kill the child, but she flew up into the air and disappeared.

Vâsudeva grew up under the care of his foster-mother Yaśodâ without her knowing that he had been exchanged for her daughter, but Kaṁsa got some inkling of the matter. Now he tried to get the child into his power by cunning plans, but all of them turned out against him. Lastly, Kaṁsa demanded from his parents that they should send him (Vâsudeva) to wrestle in his (Kaṁsa's) presence. Now Vâsudeva began to behave overbearingly towards everybody. On the road he had already roused the wrath of his aunt by hurting a serpent which had been appointed to watch over the lotus flowers of a pond, for he had drawn a cord through its nostrils like a bridle. Further, he had killed his fuller, because the latter had refused to lend him clothes for the wrestling. He had robbed the girl who accom-
Page 201. panied him of the sandal-wood with which she was ordered to anoint the wrestlers. Lastly, he had killed the rutting elephant which was provided for the purpose of killing him before the door of Kaṁsa. All this heightened the wrath of Kaṁsa to such a degree, that his bile burst, and he died on the spot. Then Vâsudeva, his sister's son, ruled in his stead.

The names of Vâsudeva in the different months.

Vâsudeva has a special name in each month. His followers begin the months with Mârgaśîrsha, and each month they begin with the eleventh day, because on this day Vâsudeva appeared.

The following table contains the names of Vâsudeva in the months:—

The Months.	The Names of Vâsudeva.	The Months.	The Names of Vâsudeva.
Mârgaśîrsha	Keśava	Jyaishṭha	Trivikrama
Pausha	Nârâyaṇa	Âshâḍha	Vâmana
Mâgha	Mâdhava	Śrâvaṇa	Śrîdhara
Phâlguna	Govinda	Bhâdrapada	Hṛishîkeśa
Caitra	Vishṇu	Âśvayuja	Padmanâbhi
Vaiśâkha	Madhusûdana	Kârttika	Dâmodara

Continuation of the story of Vâsudeva.

Now the brother-in-law of the deceased Kaṁsa became angry, went rapidly to Mathurâ, took possession of the realm of Vâsudeva, and banished him to the ocean. Then there appeared near the coast a golden castle called Barodâ, and Vâsudeva made it his residence.

The children of Kaurava (*i.e.* Dhṛitarâshṭra) had the charge of their cousins (the children of Pâṇḍu). Dhṛitarâshṭra received them and played dice with them, the last stake being their whole property. They lost more and more, until he laid upon them the obligation of expatriation for more than ten years, and of concealment in the remotest part of the country, where nobody knew them. If they did not keep this engagement they would be bound to return into banishment for a like number of years. This engagement was carried out, but finally came the time of their coming forward for battle. Now each party began to assemble their whole number and to sue for allies, till at last nearly innumerable hosts had gathered in the plain of Tâneshar. There were eighteen *akshauhiṇî*. Each party tried to gain Vâsudeva as ally, whereupon he offered either himself or his brother Balabhadra together with an army. But the children of Pâṇḍu preferred him. They were five men—Yudhishṭhira, their leader, Arjuna, the bravest of them, Sahadeva, Bhîmasena, and Nakula. They had seven *akshauhiṇî*, whilst their enemies were much stronger. But for the cunning devices of Vâsudeva and his teaching them whereby they might gain victory, they would have been in a less favourable situation than their enemies. But now they conquered; all those hosts were destroyed, and none remained except the five brothers. Thereafter Vâsudeva returned to his residence and died, together with his family, who were called Yâdava. Also the five brothers died before the year had reached its end, at the end of those wars.

End of Vâsudeva and of the five Pâṇḍu brothers.

Vâsudeva had concerted with Arjuna the arrangement that they would consider the quivering of the left arm or left eye as a mysterious intimation that there was something happening to him. At that time there lived a pious Ṛishi called Durvâsas. Now the brothers and relations of Vâsudeva were a rather malicious, inconsiderate set of people. One of them hid under his coat a new frying-pan, went to the anchorite, and asked him what would be the result of his pregnancy, jeering at the pious man. The latter said, "In thy belly there is something which will be the cause of thy death and that of thy whole clan." When Vâsudeva heard this he became sorry, because he knew that these words would be fulfilled. He gave orders that the pan should be filed away and be thrown into the water. This was done. There was only a small part of it left, which Page 202. the artisan who had done the filing considered as insignificant. Therefore he threw it, as it was, into the water. A fish devoured it; the fish was caught, and the fisherman found it in its belly. He thought it would be a good tip for his arrow.

When the predestined time came, Vâsudeva rested on the coast under the shadow of a tree, one of his feet being crossed over the other; the fisherman took him for a gazelle, shot at him, and hit his right foot. This wound became the cause of the death of Vâsudeva. At the same time the left side of Arjuna began to quiver, and then his arm. Now his brother Sahadeva gave orders that he should never any more embrace anybody, that he might not be bereft of his strength (?). Arjuna went to Vâsudeva, but could not embrace him on account of the state in which he was. Vâsudeva ordered his bow to be brought, and handed it over to Arjuna, who tried his strength at it. Vâsudeva ordered him to burn his body and the bodies of his relations when they had died, and to bring away his wives from the castle, and then he died.

Out of the filings or bits of iron which had fallen off when the pan was filed a *bardî* bush had grown. To this there came the Yâdavas, who tied together some bundles of its twigs to sit upon. Whilst they were drinking there arose a quarrel between them; they beat each other with the *bardî* bundles, and killed each other. All this happened near the mouth of the river Sarsatî, where it flows into the sea, near the situation of Somanâth.

Arjuna had done all he had been ordered by Vâsudeva. When he brought away the women, they were suddenly attacked by robbers. When, now, Arjuna was no longer able to bend his bow, he felt that his strength was going. He whirled the bow in a circle above his head, and all who stood under the bow were saved, while the others were seized by the robbers. Now Arjuna and his brothers saw that life was no more of any use to them, therefore they emigrated to the north and entered the mountains, the snow of which never melts. The cold killed them one after the other, till at last only Yudhishṭhira remained. He obtained the distinction of being admitted to paradise, but before that he was to pass through hell in consequence of the sole lie which he had spoken in his life, at the request of his brothers and of Vâsudeva. These were the words which he had spoken within hearing of the Brahman Droṇa: "Aśvatthâman, the elephant, has died." He had made a pause between *Aśvatthâman* and *the elephant*, by which he had led Droṇa to believe that he meant *his son*. Yudhishṭhira spoke to the angels: "If this must be, may my intercession be accepted on behalf of the people in hell; may they be freed from it." After this desire of his had been granted, he went into paradise.

CHAPTER XLVIII.

AN EXPLANATION OF THE MEASURE OF AN AKSHAUHIṆÎ.

EACH	*akshauhiṇî*	has	10 *anîkinî.*
„	*anîkinî*	„	3 *camû.*
„	*camû*	„	3 *pṛitanâ.*
„	*pṛitanâ*	„	3 *vâhinî.*
„	*vâhinî*	„	3 *gaṇa.*
„	*gaṇa*	„	3 *gulma.*
„	*gulma*	„	3 *senâmukha.*
„	*senâmukha*	„	3 *patti.*
„	*patti*	„	1 *ratha.*

IN chess, the latter is called *rukh,* whilst the Greeks call it *chariot of war.* It was invented by *Mankalus* (Myrtilos?) in Athens, and the Athenians maintain that they were the first who rode on chariots of war. However, before that time they had already been invented by Aphrodisios (*sic*) the Hindu, when he ruled over Egypt, about 900 years after the deluge. They were drawn by two horses.

The following is a tale of the Greeks: Hephæstos loved Athene and desired to possess her, but she refused him, preferring to remain a virgin. Now he concealed himself in the country of Athens, and intended to seize her by force, but she pierced him with a spear and then he let her go. From a drop of his blood, which had dropped to the earth, there grew Erichthonios. He Page 203.
arrived on a chariot like the tower of the sun, the holder of the reins riding together with him. Similar to this are the customs of the hippodrome, as they exist in our time, the running and driving with carriages in the race.

A *ratha* comprehends besides, one elephant, three riders, and five footmen.

All these orders and divisions are necessary for the preparation for battle, for pitching camp and breaking up camp.

An *akshauhiṇī* has 21,870 chariots, 21,870 elephants, 65,610 riders, 109,350 footmen.

To each chariot there belong four horses and their conductor, the master of the chariot, armed with arrows, his two companions armed with spears, a guard who protects the master from behind, and a cartwright.

On each elephant there sits its conductor, and behind him the vice-conductor, a man who has to goad the elephant behind the chair, the master, armed with arrows, in the chair, and together with him his two spear-throwing companions and his jester, *hauhava* (?), who on other occasions runs before him.

Accordingly the number of people who ride on chariots and elephants is 284,323 (*sic*). The number of those who ride on horses is 87,480. The number of elephants in an *akshauhiṇī* is 21,370; the number of chariots, too, is 21,870; the number of horses is 153,090; the number of men, 459,283.

The sum-total of the living beings of one *akshauhiṇī*, elephants, horses, and men, is 634,243; the same number for eighteen *akshauhiṇī* is 11,416,374, viz. 393,660 elephants, 2,755,620 horses, 8,267,094 men.

This is an explanation of the *akshauhiṇī*, and of its single parts.

END OF VOL. I.

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